

STUDY SERIES  
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**A Usability and Accessibility Evaluation  
of the Foreign Trade Division's AESDirect Web Site**

Part I: Usability  
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# **A USABILITY and ACCESSIBILITY EVALUATION of the FOREIGN TRADE DIVISION'S *AESDIRECT* WEB SITE**

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## Abstract

The Automated Export System (AES) *Direct* is an Internet-based, computerized self-administered questionnaire (CSAQ). It is intended to support participants as they file their electronic export information. *AESDirect* is used for all exports, aside from those to Canada, that are valued over the amount of \$2500.00. In the fall of 2006 the Census Bureau's usability lab evaluated the usability and accessibility of the *AESDirect* application. The usability study focused entirely on the *AESDirect* CSAQ, while the accessibility study focused on *AESDirect* and its supporting software applications (Certification Quiz, the tutorial installation wizard and tutorial, the User Guide, WebLink, and AESPcLink).

The methods used in the two studies are detailed in this report, along with the findings and recommendations.

This report is in two parts: part one is the usability evaluation and part two is the accessibility evaluation. In part one, the researchers report on their methods of obtaining a baseline on participant performance (accuracy and efficiency) and satisfaction with the user-interface design. We identify prioritized list of usability problems with possible solutions, and identify ways to incorporate user-centered design into the *AESDirect* CSAQ. Some of the high-priority findings include user difficulties in understanding how to get started using the application, difficulty with filling out the form, users expecting a simple way to submit or save their data and finding none, user problems with the "Help", and the use throughout the application of too much technical terminology or jargon.

In part two, accessibility issues are identified and a priority, high medium, or low, is assigned to indicate the severity of the problems. Among other findings, the accessibility evaluation revealed color is used by itself to identify completion status; tutorial screens have text that cannot be detected by screen reading software, and AESPcLink lookup screen search results are displayed in inaccessible tables. Recommendations are made for resolving the accessibility issues.

## **Executive Summary Part I: Usability Evaluation**

This usability evaluation was performed on the *AESDirect* Web site. *AESDirect* is an automated system intended to support the general public and companies as they file their electronic export information (EEI). The *AESDirect* Usability Team had the following objectives for the evaluation:

- Obtain a baseline on participant performance (accuracy and efficiency) and satisfaction with the user-interface design
- Identify a prioritized list of usability problems and possible solutions
- Identify ways to incorporate user-centered design into the *AESDirect* CSAQ

### **Methods**

The *AESDirect* Usability Team decided the two major participant groups were made up of (1) the novice or general participant who would be interested in mailing something overseas valued at over \$2,500, and (2) the expert participant who likely works for an exporting company, has used the site frequently and, thus, has his/her own participant name and password.

We worked with eight novice participants, two experts, and two *AESDirect* keyers who were brought in to represent expert participants. We developed a set of logging codes and had all participants' use the "think-aloud" protocol while working on their tasks. Each participant group worked on a representative task: Novices worked on filing a new Electronic Export Information (EEI) and getting a confirmation number for it. Experts worked on reviewing a previously filed Shippers Export Declaration (SED), which had some fictitious fatal errors that needed to be corrected in order to get the confirmation number.

### **Summary of Results**

The usability study revealed that the mean accuracy score for novice participants was 32 percent. The mean efficiency score for novice participants was 47:38 minutes per session. Novice satisfaction score was 4.4 out of a possible high of 9, with 1.7 as the standard deviation—the average variation between all the ratings given by the participants and the mean rating of a particular item. These can be considered the baseline values for novices.

For experts, mean accuracy was 86 percent. Mean efficiency for expert participants was 35:22 minutes per session. Expert satisfaction was 6 (with .2 as the standard deviation). These can be considered the baseline values for experts.<sup>1</sup>

Reasons for the performance deficits may be found in the list of [Usability Problems and Solutions](#) section of this report. Major usability problems and recommendations for resolving them are listed below. All identified problems and recommendations are given in the body of the report.

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<sup>1</sup> The caveat to this, however, is that this baseline is only based on two expert participants, not the desired number of at least eight expert participants.

1. Problems with getting started: All participants experienced problems initially trying to get started. Because the navigation was not intuitive, participants often ended up needing direction from the Test Administrator (TA) on how to access the form for the session to continue.

There needs to be a more obvious and direct way for participants to get into and begin filling out the form.

2. Problems when filling out the form: Participants came to a section of the form and were required to add in codes, yet they had (1) no idea what exactly was needed in the field, and (2) no idea where to get the code for that field.

For each data-entry point that could be confusing, consider offering additional “Help” information right next to it within the form.

3. Not able to submit or save data: Participants experienced problems when trying to save the form they were working on and move on to the next section.

Put next, back, and submit buttons at the bottom of each section of the form.

4. Problems with the Help: At different times during the sessions, participants turned to “Help.” The help was often not useful because the content did not match what the participant needed to do.

Have the Help content match the action that the participant is required to make (i.e., provide context-sensitive help).

5. Confusion with links: Participants experienced some confusion about knowing which words were actually links.

To simplify navigation, consider using the Web-standard link colors throughout the site: Unvisited Links: Underlined Blue; Visited links: Underlined Purple.

6. Too much AES*Direct* technical terminology: Participants commented that they were confused by the expert-level terminology, the abbreviations and the acronyms.

If it is necessary to include the acronyms, also include more informative information in layperson’s language (plain English).

Although participant satisfaction was generally neutral, the usability violations identified have the potential to reduce efficiency and effectiveness. The fact that these violations emerged within a tightly scripted set of scenarios makes them even more problematic. Recommendations are made to relieve the negative impacts of the usability issues and to make the software more supportive of the participant’s tasks.

We recommend using low-fidelity prototypes to try out concepts for emerging design ideas. Further usability testing on a new release is advised.

## Executive Summary Part II: Accessibility Evaluation

Since June 2001, Federal regulations have required that U. S. Government Web sites and other software developed by or for the U. S. Government provide comparable access to the information for all users<sup>2</sup>. Computer users who have visual and or other disabilities are entitled to have the same access as users who do not currently have any disabilities

This accessibility evaluation was performed on the AESDirect Shipment Export Declaration web application, the installation wizard for AESDirect tutorial, the AESDirect tutorial, the AESDirect Certification Quiz, the WebLink application, and the AESPcLink application.

This evaluation is primarily focused on testing accessibility for computer users with visual disabilities. Accessibility testing is performed using the Job Access With Speech (JAWS) 7 screen reader software<sup>3</sup>. For the purpose of this report, an item is judged to be accessible (compliant with the regulations) if its screen text is read out loud, in a coherent order by JAWS.

### Summary of Accessibility Violations and Recommendations

- Graphics containing text are not accessible. Plain text should be used instead.
- Navigational skip links, for bypassing navigation links to access screen content, are not used. *AESDirect* should be reprogrammed to provide the means to bypass navigation bars.
- Color is used by itself to identify completion status. Completion status could be identified by an asterisk ( \*) preceding the text label.
- Tutorial installation screens have inaccessible text. Plain text should be used instead of an image of a page.
- Screen shots within the *AESDirect* user guide do not provide alternate text describing the contents on the screen. Any images should be described using alternative (Alt) text.
- The *AESDirect* tutorial text is inaccessible, and keyboard commands do not function as expected. The tutorial needs to be reprogrammed to permit keyboard access.
- WebLink lookup screens have inaccessible labels and buttons. Inaccessible labels should be replaced by plain text and button labels should match the displayed label.
- AESPcLink lookup screen search results are displayed in inaccessible tables. Values in data tables must be associated by an ID code to its corresponding row stub and column header.

Once changes are made, *AESDirect* should be re-evaluated for its compliance with the Federal accessibility regulations.

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<sup>2</sup> <http://www.section508.gov/index.cfm?FuseAction=Content&ID=3>

<sup>3</sup> <http://www.freedomscientific.com>

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## **Part I: Evaluation of Usability for AES*Direct***

### **I.1. Introduction to Usability Evaluation**

The Automated Export System (AES)*Direct* Web site is a computerized self-administered questionnaire (CSAQ). It is an automated system intended to support participants' as they file their electronic export information (EEI). The site was developed in 1997, implemented in 1999 and has only undergone slight alterations over the past seven years. In 2000 an expert review requested by the Foreign Trade Division (FTD) was conducted through the Census Bureau's Usability Lab by four usability and human-computer interface design experts. Although a few of the recommendations were implemented, most of the problems were not addressed and, anecdotally, still exist. Within FTD, there is a growing interest in a complete redesign of the site. This interest is offset by cost concerns.

Before making any changes, FTD contacted staff of the Usability lab, and together they created a team to look into the issues more deeply. The AES*Direct* Usability Team consist of the following members:

- Erica Olmsted-Hawala, Alex Trofimovsky, and Betty Murphy from the Statistical Research Division
- Paul Newman, Maurice Eleby, and Elisabeth Miller, from the Foreign Trade Division.

There was interest from the team in conducting a baseline usability study before any redesign efforts began for the purpose of generating current usability information, including participant metrics, on the system.

Testing took place between July 31, 2006 and September 15, 2006. Novice participants were scheduled for the week of July 31, 2006 through August 4, 2006. Our two expert participants were scheduled for August 18, 2006. The two FTD keyers were scheduled for September 15, 2006.

#### **I.1.1 Purpose of Usability Testing**

The primary purpose of usability testing was to obtain a baseline on participant performance (accuracy and efficiency) and satisfaction with the user-interface design for filing the EEI. We evaluated the site against both qualitative and quantitative goals for usability, as detailed in [Appendix A](#). With this information, as the site undergoes redesign, the developers and subject-matter experts will be able to gauge improvements to the interface and participant performance.

In addition, the baseline usability study was conducted to identify usability problems and offer possible recommendations.

#### **I.1.2 Scope of Usability Testing**

The AES*Direct* system is used by both novice participants and more experienced or expert participants. The team determined we should attempt to recruit from both participant groups. Everyone (including the general public and any company or government entity) in the U. S. who

intends to send an item overseas worth \$2,500.00 or more is required by law to first obtain a Shippers Export Declaration (SED) number. One way that they can get the SED is through the *AESDirect* online Web site.

Usability testing focused on the following participant tasks:

Novice Participants

- Filing an EEI and getting a confirmation number for it
- Responding to error messages throughout the filing process

Expert Participants

- Checking for responses and making corrections (reviewing prior entered data and making changes)
- Retrieving shipments
- Correcting fatal errors

All test participants used fictitious shipping information that we provided to them as the basis for completing the tasks.

## **I.2. Usability: Methods and Procedures**

In this section we provide the characteristics of the participants, explain how we recruited participants, and summarize test procedures. We describe our facilities, the computing environment, and the videotaping of test sessions. After this we describe our usability materials: the consent form, the questionnaire on computer use and internet experience, introduction to a testing session, the satisfaction questionnaire, and our debriefing questions. Next, we describe the usability testing procedure, logging, performance measurement methods (accuracy, efficiency, and satisfaction), and collaboration with FTD.

### **I.2.1 Usability Participants**

SRD recruited twelve participants in total (eight novice participants, two FTD data keyers, and two expert participants). For the novice participants, we had 4 males and 4 females. Both expert participants were male and both FTD data keyers were female.

To recruit novice participants, SRD staff posted a promotional notice on Craig's List.org, under community, volunteers (see [Appendix B](#)). Of the many potential participants who replied, eight were recruited on a first-come-first-served-basis. Recruiting questions were asked of novices only (see [Appendix C](#)). Participants' computer experience was relatively high (4.3 out of a possible 5) with .4 standard deviation. Basically, novice participants met the following qualifications:

- At least one year of experience with the Internet
- Have mailed items overseas or could potentially see themselves as needing to mail an item valued at over \$2,500 overseas

To recruit expert participants, SRD contacted the expert participants on the list supplied by FTD.

The assumption was that the people on the list had the following qualifications:

- Registered with their own participant name and password to use the *AESDirect* online system
- Have already completed and successfully passed the certification quiz

We were given a list of 16 different people/companies, and SRD made contact with each company at least three times. We were only able to get two experts scheduled. Three said they were not qualified; five could not be contacted by phone and/or email; one was too busy to participate in the study, and the rest never responded to our email/phone requests. Each contact was emailed and phoned twice.

Since we were unable to recruit enough expert participants, FTD recommended we use the FTD data keyers to play the part of experts. FTD contacted the keyers and, once they agreed to participate in the study, SRD set up the sessions.

*Payment to Participants.* Novice participants were not federal employees and were paid \$40.00 for participating in the study. We felt that the size of the incentive (\$40.00) we offered expert participants was not sufficient to encourage them to participate. With the approval of SRD's coordinator for these matters, we increased the payment to \$65.00 for the expert participants because of the very fact that they were "experts." However, we were still unable to recruit more expert participants. The FTD data keyers were federal employees and, thus, were not paid.

## **I.2.2 Usability Facilities and Equipment**

*Participant Room.* The usability participants came to the Census Bureau's Usability Laboratory in Suitland, MD for the testing sessions (Room 3224-4 at Suitland Federal Center). The participant sat in a small room, facing a one-way glass and wall-mounted camera, under a ceiling-mounted camera, and in front of a Liquid Crystal Display (LCD) monitor placed on a table at standard desktop height. The workstation included a standard keyboard and mouse. Two microphones picked up sound in each testing room. The participant and Test Administrator (TA) communicated via an audio intercom arrangement.

*Computing Environment.* The participant's workstation consisted of a Dell OptiPlex GX150 personal computer with a Pentium IV processor and 512 MB of RAM, a Dell 17-inch LCD monitor set at 800 by 600 resolution with 256-bit or higher color, a standard 101/102 key quiet keyboard, and a PS2 IntelliMouse with a wheel. The operating system was Windows 2000 for all participants.

*Audio and Video Recording.* Video of the participant was received by Computer Digital wall-mounted camera, with remote position, focus, and zoom controls. Video of the application on the participant's monitor was fed through a PC Video Hyperconverter Gold Scan Converter, mixed in a picture-in-picture format with the camera video, and recorded via a Sony DSR-20 digital Videocassette Recorder on 124-minute, Sony PDV metal-evaporated digital videocassette tape. Audio was picked-up from one desk and one ceiling microphone near the participant, and from a push-to-talk console microphone in the test administration room. The audio sources were mixed in a Shure audio system, eliminating feedback, and fed to the videocassette recorder.

Audio and video were optionally fed into 26-inch television receivers for simultaneous viewing by clients or other observers.

### **I.2.3 Usability Materials**

*Consent Forms.* All participants but one signed a form consenting to be videotaped. A sample of the consent form is provided in [Appendix D](#). The one participant who did not sign the consent form felt uncomfortable with being video taped. For this reason she was not video taped and, instead, the logger and the TA took notes on paper during the session. For all other participants, taping began after they signed the consent form.

*Questionnaire on Computer Use and Internet Experience.* Participants were given a short questionnaire to assess their experience with computers, the Internet, and for expert participants, with the AESDirect web site ([Appendix E](#)).

*Introduction to a Testing Session.* A copy of the introduction read to participants is provided in [Appendix F](#). A major purpose of the introduction was to assure participants that they were assisting in evaluating the software, not having their own abilities tested. During the introduction, the participants had several opportunities to ask questions.

*Satisfaction Questionnaire.* A tailored version of the Questionnaire for User-Interaction Satisfaction (QUIS) appears in [Appendix G](#). The QUIS items have been adopted by consensus of the AESDirect Usability Team. The original QUIS was developed and validated at the University of Maryland (Chin, Diehl and Norman, 1988).

*Debriefing Questions.* The kinds of questions asked during the debriefing portion of the session appear in [Appendix H](#). These questions were formulated, revised, and adopted by consensus of the AESDirect Usability Team. The TA was not limited to these questions but asked others, depending on the specific situation for each participant and the content of the think-aloud verbalizations.

### **I.2.4 Usability Testing Procedure**

Before any testing began, we conducted two dry run sessions. We used a summer intern as the participant for the novice dry run session, and a usability lab member played the role of an expert participant for the expert dry run session. Based on the dry run sessions, we tweaked the tasks and the protocol slightly. For example, if there was a slight ambiguity in a form related to the task, we tweaked the form.

*Roles.* There were four distinct roles during the sessions:

1. Test Administrator (TA),
2. Logger/note-taker,
3. Participant and the
4. Observers from SRD and FTD.

*Event Sequence from greeting the participants to dismissing them.* The typical session progressed as follows:

- Equipment was turned on and operating
- TA greeted the participant in the hallway
- Participant was ushered into a testing room and seated facing monitor
- TA sat down with participant and read an introductory explanation
- TA explained that we wanted participant to use the Think Aloud protocol
- Participant practiced Think Aloud protocol by going to a web site of their choice, often [www.craigslist.org](http://www.craigslist.org) and searched for something while thinking aloud
- Participant filled out pre-questionnaire
- Participant signed a videotaping consent form
- TA gave participant tasks, left the room, and re-established voice contact with participant from the adjacent test administration room
- TA started video and audio recording, read final instructions, and administered the testing session
- Participant filled out a participant satisfaction questionnaire
- TA debriefed participant on the session
- Paymaster paid the participant; participant signed a receipt for cash payment.
- TA thanked and dismissed the participant

*Interaction between Test Administrator and Participant—Concurrent Think Aloud.* Each participant was asked to “think aloud” while working on the tasks, that is, to provide a running commentary about the issues, expectations and decisions involved in accomplishing the work. Think aloud was described and practiced before the sessions began. The TA encouraged the participant to resume commenting whenever he or she fell silent.

The think aloud procedure causes participants’ performance to slow down somewhat, and is not used in studies where exact measures of performance time are more important than discovering the respondents’ cognitive processes. In the latter, a “retrospective” think aloud is sometimes used, asking the participant to recall issues, expectations, and decisions after each task has been completed. In this study, the concurrent think aloud procedure was followed.

*Test Administrator Probes and Questions.* The TA used *ad hoc* questions to teach and motivate the participant to provide the kinds of comments needed to understand participant problems and their possible causes. The TA did not provide help to the participant as a matter of course during the session.

Self blame. Whenever the participant apologized for “being stupid” or expressed other self-blame, the TA explained that the application was designed for participants “with your characteristics,” so the problems you experience are the fault of the design, not you.

Doubts about performance. When participants expressed doubt that we were getting anything meaningful out of watching their performance, the TA explained that we were learning what was wrong with the application from them, and that their comments were providing exactly the kind of information we needed.

Frustration. If the participant expressed frustration, the TA would provide assurance that “we need to know that information,” and that we were getting important insights about what needed to be fixed.

Silence. When a participant stopped the think aloud commentary during a task, the TA probed with statements or questions like, “What are you thinking about?” “Is that what you expected to happen?” “Keep talking,” or “What do you think will happen next?”

*Test Administrator assists and reactions to errors.* If it appeared that a participant was very stuck and couldn’t move forward in the site, (e.g., the participant did not see how to highlight a section in the white scroll box and click Edit SED,) the TA helped move the participant along. She did this so that we could get additional usability feedback on the other pages of the site.

The TA avoided answering any direct question about the correctness of an answer or action. If the participant asked whether an answer was correct after a task was finished, the TA asked whether they felt it was correct and what were their impressions of the task/site.

*Tasks.* Novice and expert participants were given different tasks; each was representative of what their participant group would do when/if they used the site. Both tasks were made up of subtasks, which participants could work on at any time during the session. A task encompassed the participant’s goal for the entire session, and the subtasks were individual components of achieving the task goal.

For novice participants, a handout was given to the participant with a made-up task scenario. The task required the participant to fill out the CSAQ on the Web site in order to get a shipper’s export declaration (SED) number and a confirmation number. This is a typical task that anyone shipping an item worth \$2,500 or more overseas must accomplish. See [Appendix I](#). The subtasks consisted of the following:

- a) Logging in
- b) Getting into shipment information by clicking the edit section
- c) Entering the USPPI and filling it out
- d) Entering the ultimate consignee and filling it out
- e) Entering the optional freight forwarder section, and filling it out
- f) Sending an SED

Expert participants received a handout with a made-up task scenario. This scenario required the participant to retrieve their fictionalized original shipment information, check for responses, and make corrections. See [Appendix J](#). The subtasks consisted of the following:

- a) Logging in
- b) Identifying three errors
- c) Fixing three errors
- d) Submitting and receiving ITN

*Presentation of Tasks to Participant.* The participant was given two pages: the first page was a description of the task and information on how to get started (Log in, password, etc.), the second page was an invoice that they used to help them complete the task.

The TA asked the participant to read the task out loud and then asked the participant to talk about what they planned to do upon reading the task, e.g., “go ahead and read the task and talk to me about what you are ready to do as you do it...” If the participant had any questions about the task or on how to get started, the TA answered them.

*Starting Page for Task.* The TA started the participant on the main AESDirect web page (<http://www.aesdirect.gov/>). After this, any of the pages participants went to as they worked on their task were acceptable and allowed throughout the duration of the session.

### **I.2.5 Logging Usability Sessions**

The note-taker logged notes onto a computer file using Noldus Observer V5.0 logging software. The note-taker typed a two-or-three key code to indicate the observation category (see [Appendix K](#)) and entered a more detailed description of the comment. The software added a time code to each observation. Time codes and comments were used in data analysis and report preparation, described later.

### **I.2.6 Usability Performance and Satisfaction Measurement Methods**

Next we explain how we measured the three components of usability: accuracy, efficiency and satisfaction.

#### **I.2.6.1 Accuracy**

*Novice Accuracy.* Each subtask (i.e., portions of the overall novice task) is scored either correct or incorrect. These are the basis for the average accuracy performance scores.

*Criteria for scoring novice correctness.* A subtask was scored correct if the participant announced or executed the correct answer.

The average accuracy score is the mean of two means: (1) the number of subtasks scored correct divided by the total number of subtasks across questions and (2) the number of subtasks scored correct divided by the total number of subtasks across participants.

*Expert Accuracy.* Task A and D were scored either correct (i.e., 100 percent) or incorrect (i.e., 0 percent). Tasks B and C had three portions within them and each was worth 33 percent. Each portion of the subtask was also scored correct or incorrect. These are the basis for the average accuracy performance scores.

*Criteria for scoring expert correctness.* A subtask was scored correct if the participant announced or executed the correct answer.

Again, the average accuracy score is the mean of two means: (1) the number of subtasks scored correct divided by the total number of subtasks across questions and (2) the number of subtasks scored correct divided by the total number of subtasks across participants.

### **I.2.6.2 Efficiency**

*Efficiency* is generally conceptualized as the speed of task completion. When tasks differ in difficulty, however, this variation needs to be considered in calculating efficiency scores. In this study, both novice and expert participants had a simple first subtask (1A for novices, A for experts). After the initial simple subtask, all the other subtasks were of equal difficulty as the participants were required to fill out a questionnaire that had similar challenges in terms of difficulty throughout the various sections of the form.

For the main task (and subtasks within the main task), we noted completion time (start to stop). We got this information from our logs.

*Task timing procedures in the data logs:* Participants were given as much time as they needed to complete the task. Most participants were in the range of an hour (some went over, and some under).

For the task, the data logger started the timer as soon as the participant clicked into a subtask and stopped when the participant moved on to another subtask. Later, the data analyst transferred the logging data to a spreadsheet and subtracted the ending time of each subtask from the starting time of each subtask to determine the time taken to complete each subtask. During data analysis, if a participant went into a subtask (e.g., freight forwarder) more than once, the time spent in each instance was added together. The data analysis also took the total time of every subtask and added it up to be the total time spent on the task as a whole.

We include both the efficiency scores for the subtasks as well as the average overall time it took to complete the task as a whole.

If a participant did not start a task we coded this as a “no data” in the efficiency table below. The “no data” were not included in the analysis.

### **I.2.6.3 Satisfaction**

*Satisfaction.* The subjective satisfaction score is derived from ratings made by the participants after the test.

*Final Questionnaire for User-Interaction Satisfaction:* After the session was finished, participants indicated their satisfaction, overall and with specific aspects of the application, on a shortened, 11-item version of the QUIS, the Questionnaire for User Interaction Satisfaction (Chin, Diehl and Norman, 1988). See [Appendix G](#).

*Scoring procedures: Average Overall Satisfaction:* The numeric answers to the QUIS are averaged for (a) each participant and (b) across participants.

The QUIS is used to compute average Overall Satisfaction on a 9-point Likert scale. For example, participants were asked to rate their overall reaction to the site by circling a number from 1 through 9 with 1 being the lowest possible score and 9 being the highest.

#### **I.2.6.4 Identifying and Prioritizing Usability Problems**

To identify site design elements that caused participants to have problems, the data logger and TA reviewed the videotapes and logging data for instances where participants were either unable to get an answer, got an incorrect answer, were inefficient at getting an answer, or expressed frustration with the site while seeking an answer. By noting participant behavior and comments, the analysts inferred the likely cause (in the site design) for the difficulty in each instance. The analysts then grouped similar design problems into broader problem categories and wrote the descriptions and recommendations given in the text.

The analysts assigned each problem a priority code, based on its effect on performance, as follows:

*High Priority:* Design problems that caused some participants not to achieve their task objective or to get an incorrect answer.

*Medium Priority:* Design problems that misled, distracted, or slowed down the participant but were usually overcome and the task objective eventually reached. Design problems that caused participant dissatisfaction.

*Low Priority:* Potential problems that the analyst identified on the basis of a general knowledge of user-centered design principles, but that were not observed to affect participant performance during the test.

#### **I.2.7 Collaboration with FTD**

We encouraged key members of FTD to come and watch the live usability sessions and/or the videotapes. As they had time, FTD members did come and give us feedback on what they had seen. With their perspective and knowledge of *AESDirect*, it was helpful for them to get a feel for what was happening during the sessions. As work on findings and recommendations was coming together, it was helpful to have consultation with the key staff. We hope to continue more of this as we move forward with continued work on *AESDirect*.

### I.3. Results and Recommendations of Usability Testing

Results for the usability study are discussed in this section. The quantitative data and usability findings are presented below.

We recommend that the *AESDirect* Usability Team work together to mock up on paper any changes to the interface and bring in external participants to have them look at, and work with, the prototypes. This will give us iterative and ongoing feedback to the prototype designs before any changes are implemented on the site. This will likely save money and fine-tune the emerging design to be more user-centered.

#### I.3.1 Usability Participant Accuracy

Novice Accuracy:

Novice accuracy scores are in Table 1 for novice participants and tasks. Codes for the subtasks are listed in Table 2. Average accuracy scores range from 0 percent to 100 percent across the subtasks and from 14 percent to 57 percent across the participants. The accuracy rate for all participants completing the overall task was 0 percent (i.e. no participant was able to successfully and correctly submit an SED). The overall mean for subtask accuracy is 32 percent. These are the baseline accuracy scores for novice participants.

**Table 1: Usability Study: Novice Accuracy Scores**

Participant #	Subtask								Mean Percent
	1A	1B	1C	1D	1E	1Fr	1F		
1	S	F	F	\F	\F	\F	F	14	
2	S	F	S	S	\F	\F	F	42	
3	S	S	F	\F	S	S	F	57	
4	S	S	F	\F	F	\F	F	28	
5	S	S	F	\F	\F	\F	F	29	
6	S	F	F	F	\F	\F	F	14	
7	S	F	F	\F	\F	\F	F	14	
8	S	F	S	S	F	S	F	57	
Mean Percent	100	37	25	25	12	25	0	32	

Legend: S=success/100 percent, F=failure/0 percent, \F=failure due to not attempting the task/0 percent

Note: \F stands for failure due to not entering into the task. Subtasks are explained in the table below.

**Table 2: Usability Study: Novice subtasks**

Subtask 1A:	Participant logs in and clicks create new shipment
Subtask 1B:	Participant begins editing the new shipment window
Subtask 1C:	Participant begins editing the USPPI window
Subtask 1D:	Participant begins editing the Ultimate Consignee window
Subtask 1E:	Participant begins editing an add line item
Subtask 1Fr:	Participant begins editing the (optional field) Freight Forwarder
Subtask 1F:	Participant sends complete and correct SED

Note: Subtasks are explained in this table to give the reader a better “picture” of the novice task

Expert Accuracy:

Accuracy scores are in Table 3 for expert participants and tasks. Codes for the subtasks are listed in

Table 4. Average accuracy scores range from 66 percent to 100 percent across the subtasks, and from 81 percent to 86 percent across the participants. The overall accuracy rate is 86 percent. This is the baseline accuracy score for the expert participants.

**Table 3: Usability Study: Expert Accuracy Scores**

Participant #	Subtask A	Subtask B	Subtask C	Subtask D	Mean Percent
1	S	S	66	S	86
2	S	75	66	S	81
Mean Percent	100	88	66	100	86

Legend: S=success/100 percent

**Table 4: Usability Study: Expert Subtasks**

Subtask A:	Participant logs in
Subtask B:	Participant identifies errors
Subtask B1:	<ul style="list-style-type: none"> <li>▪ Identifies problem with first name</li> <li>▪ Identifies amount of commodity</li> </ul>
Subtask B2:	in item 1
Subtask B3:	<ul style="list-style-type: none"> <li>▪ Identifies date of shipment</li> </ul>
Subtask C:	Participant fixes three errors
Subtask C1:	<ul style="list-style-type: none"> <li>▪ Fixes problem with first name</li> <li>▪ Fixes amount of commodity in</li> </ul>
Subtask C2:	item 1
Subtask C3:	<ul style="list-style-type: none"> <li>▪ Fixes date of shipment</li> </ul>
Subtask D:	Participant submits/ gets ITN

Note: Subtasks are explained in this table to give the reader a better “picture” of the novice task

### I.3.2 Usability Participant Efficiency

Novice Efficiency:

Novice efficiency scores are provided in Table 5 for each participant and task/subtasks. Subtasks are listed in Table 6 below. The numbers in the cells reflect the amount of time the participant took to complete the subtasks. The means reflect the average time-on-task for eligible subtasks. We also include a column on the total time spent on the task and the mean of the total task time.

Average efficiency scores for individual novice participants range from 2 minutes 12 seconds to 16 minutes 45 seconds. Across subtasks, they range from 4 minutes and 22 seconds to 16 minutes 51 seconds. For the total test, the average efficiency score is 47 minutes and 38 seconds. This is the baseline for the novice efficiency score.

Participants were given as much time as they needed. Most participants were within the range of an hour. Two went over (participants 3 and 8) and some were under an hour. Worth noting for the shorter amount of time spent on the total task are participants 1, 5, and 7. These participants felt considerably stuck and were unable to complete the task.

**Table 5: Usability Study: Novice Efficiency Scores (in minutes: seconds)**

Participant #	1A	1B	1C	1D	1E	1Fr	1F	Mean	Total Task Time
1	17:07	08:17	03:24	No data	No data	No data	No data	07:12	28:51
2	01:20	22:30	06:38	07:06	No data	No data	04:31	08:25	42:06
3	16:03	02:49	43:41	No data	16:38	20:40	00:36	16:45	100:30
4	11:57	11:33	22:27	No data	01:07	No data	05:20	10:29	52:25
5	02:03	05:15	01:23	No data	No data	No data	No data	02:12	08:49
6	01:53	16:57	12:35	08:24	No data	No data	08:54	09:45	48:45
7	02:35	04:18	26:01	No data	No data	No data	02:32	08:51	35:27
8	02:02	00:49	18:36	03:57	23:53	01:54	12:52	08:51	104:07
Mean	06:53	09:03	16:51	06:29	13:53	11:17	04:22		47:38

Red text indicates that participants went into a task only once  
 “No data” means participant did not attempt this task

**Table 6: Usability Study: Novice Subtasks**

Subtask 1A:	The time between participants logging in and clicking create new shipment
Subtask 1B:	The time between participants getting to create new shipment and clicking edit
Subtask 1C:	The time between participants going from create new shipment to USPPi
Subtask 1D:	The time between participants going from USPPi and finishing Ultimate Consignee
Subtask 1E:	The time between participants getting to add line item and participants adding all items
Subtask 1Fr:	The time between participants working in Ultimate Consignee and working in (the optional field) Freight Forwarder
Subtask 1F:	The time between participants entering SED Viewer and sending a complete SED

**Expert Efficiency:**

Expert efficiency scores are provided in Table 7 for each participant and task. Expert subtasks are listed in Table 8. The numbers in the cells reflect the amount of time the user took to complete the subtasks. The means reflect the average time-on-task for eligible tasks.

Average efficiency scores for individual expert participants range from 8 minutes 16 seconds to 9 minutes 24 seconds. Across tasks, they range from 50 seconds to 17 minutes 49 seconds. For the total test, the average efficiency score is 35 minutes 22 seconds. This is the baseline expert efficiency score.

**Table 7: Usability Study: Expert Efficiency Scores (in minutes: seconds)**

Participant #	Subtask A	Subtask B	Subtask C	Subtask D	Mean	Total Time
1	0:50	6:00	14:44	16:05	9:24	37:39
2	0:51	5:19	7:21	19:34	8:16	33:05
Mean	0:50	5:39	11:02	17:49		35:22

Red text indicates that participants went into a task only once

**Table 8: Usability Study: Expert Subtasks**

Subtask A:	Log in
Subtask B:	Identify three errors
Subtask C:	Correct three errors
Subtask D:	Submit/ got ITN

### I.3.3 Usability Participant Satisfaction

The user satisfaction ratings are detailed and averaged in Table 9 for novices and in Table 10 for experts. The average QUIS satisfaction score across novice *participants* is 4.4 out of 9. The average QUIS satisfaction score for novices across QUIS *items* is 4.7 out of 9. These are the baseline satisfaction scores for novices.

The average QUIS satisfaction score across expert *participants* is 5.9 on a scale where 1 is highly negative and 9 is highly positive. The average QUIS satisfaction score for experts across QUIS *items* is also 5.9 on the same scale. These are the baseline satisfaction scores for experts.

There were particularly low participant ratings on QUIS item 11b, which asks for participant impressions of the site on a scale where 1 is very frustrating and 9 is very satisfying. This question averaged a score of 3 out of 9. In addition, all user ratings of 1 (see below) are flags indicating that there were serious problems for the user.

**Table 9: Usability Study: Overall Satisfaction Scores for Novice Participants (N = 8)**

QUIS Item #	P1	P2	P3	P4	P5	P6	P7	P8	Mean
1) Overall reaction to site	2	6	9	7	1	5	4	3	5
2) Rating ease or difficulty of task	1	3	9	7	1	5	3	1	4
3) Rating ease or difficulty of characters on computer screen	9	8	9	7	6	7	6	8	7.5
4) Rating information displayed on the site	3	3	5	3	2	7	4	3	3.75
5) Overall experience of entering information onto the site	1	8	7	6	1	5	3	2	4
6) Rating ease of moving through the questionnaire	1	4	7	6	1	6	5	3	4
7) Rating consideration of novice and expert needs	2	5	7	7	1	5	3	9	5
8) Rating ease of making changes to answers	1	8	9	5.5	NA	7	7	9	7
9) Rating consistency of terminology through the site	5	5	9	6	1	6	5	7	6
10) Rating ease or difficulty of learning to use the site	1	3	7	6	1	6	3	2	4
11a) Rating overall reaction on terrible to wonderful scale	1	4	7	7	1	5	4	3	4
11b) Rating overall reaction on frustrating to satisfying scale	1	2	4	5	1	5	1	1	3
11c) Rating overall reaction to ease or difficulty of site	1	4	7	5	1	5	3	3	4
Means by Participant	2	5	7	6	2	5	4	4	

Legend: Range where 1 was on the negative side and 9 on the positive side

Note: The “NA” points to a missing response. The one decimal (5.5) is present because a participant wrote in “5.5.”

For means relating to expert participants, 5.9 out of 9 was found. For means relating to items, 5.8 out of 9 was found. Overall, a satisfaction rating of 5.85 out of 9 was found. Overall, participants reported —based on the overall satisfaction rating of 5.85 out of 9—a moderate level of satisfaction regarding interaction with the site.

**Table 10: Usability Study: Overall Satisfaction Scores for Expert Participants (N = 2)**

QUIS Item #	P1	P2	Mean
1) Overall reaction to site	7	5	6
2) Rating ease or difficulty of task	8	8	8
3) Rating ease or difficulty of characters on computer screen	7	4	5.5
4) Rating information displayed on the site	5	5	5
5) Overall experience of entering information onto the site	6	8	7
6) Rating ease of moving through the questionnaire	6	8	7
7) Rating consideration of novice and expert needs	4	5	4.5
8) Rating ease of making changes to answers	6	8	7
9) Rating consistency of terminology through the site	4	7	5.5
10) Rating ease or difficulty of learning to use the site	5	5	5
11a) Rating overall reaction on terrible to wonderful scale	6	5	5.5
11b) Rating overall reaction on frustrating to satisfying scale	6	5	5.5
11c) Rating overall reaction to ease or difficulty of site	5	5	5
Means by Participant	5.77	6	

Legend: Range where 1 was on the negative side and 9 on the positive side

### **I.3.4 Positive Findings of the Usability Study**

1. Most participants had no difficulty logging in. Participants immediately saw the word “Log in,” and then they proceeded to enter the Log in information. One participant commented that he had expected the Log in screen to be directly on the web page, rather than in a new pop-up window, but he was still able to Log in without problems.
2. Some participants commented that they appreciated the example on how to correctly fill out the date on the Shipment Information section of the form. They said the [MM/DD/YY] next to the field made it obvious what they were supposed to enter.

### **I.3.5 Usability Problems**

Reasons for the performance deficits may be found in the list of usability violations that follows. The usability problems are prioritized from high to low in terms of their effect on participant performance. They deal primarily with difficulty in knowing how to get started with the form, how to find codes to enter information onto the form, and how to submit the form. Fixing the high- and medium-priority problems, as they occur throughout the site, should result in important/dramatic improvements in participant performance and satisfaction. There were no medium priority problems.

### I.3.5.1 High priority usability issues

Participants were confused and often brought to a standstill when trying to complete various aspects of the overall task: Getting started, filling out the form, submitting and saving data, using help, recognizing links, understanding technical terminology, and submitting the SED. Evidence from observations and video clips are presented for each of these issues.

#### I.3.5.1.1 Getting started

All novice participants experienced a great deal of difficulty initially trying to get started—there was some hesitation on the part of experts (i.e., the experts experienced many of the same problems but to a lesser extent and they were more able to recover while the novice participants often got stuck and were unable to recover. While most participants realized pretty quickly that they needed to click on the “Create New Shipment” link, it was after this that participants were often confused with what they needed to do. See Figure 1.

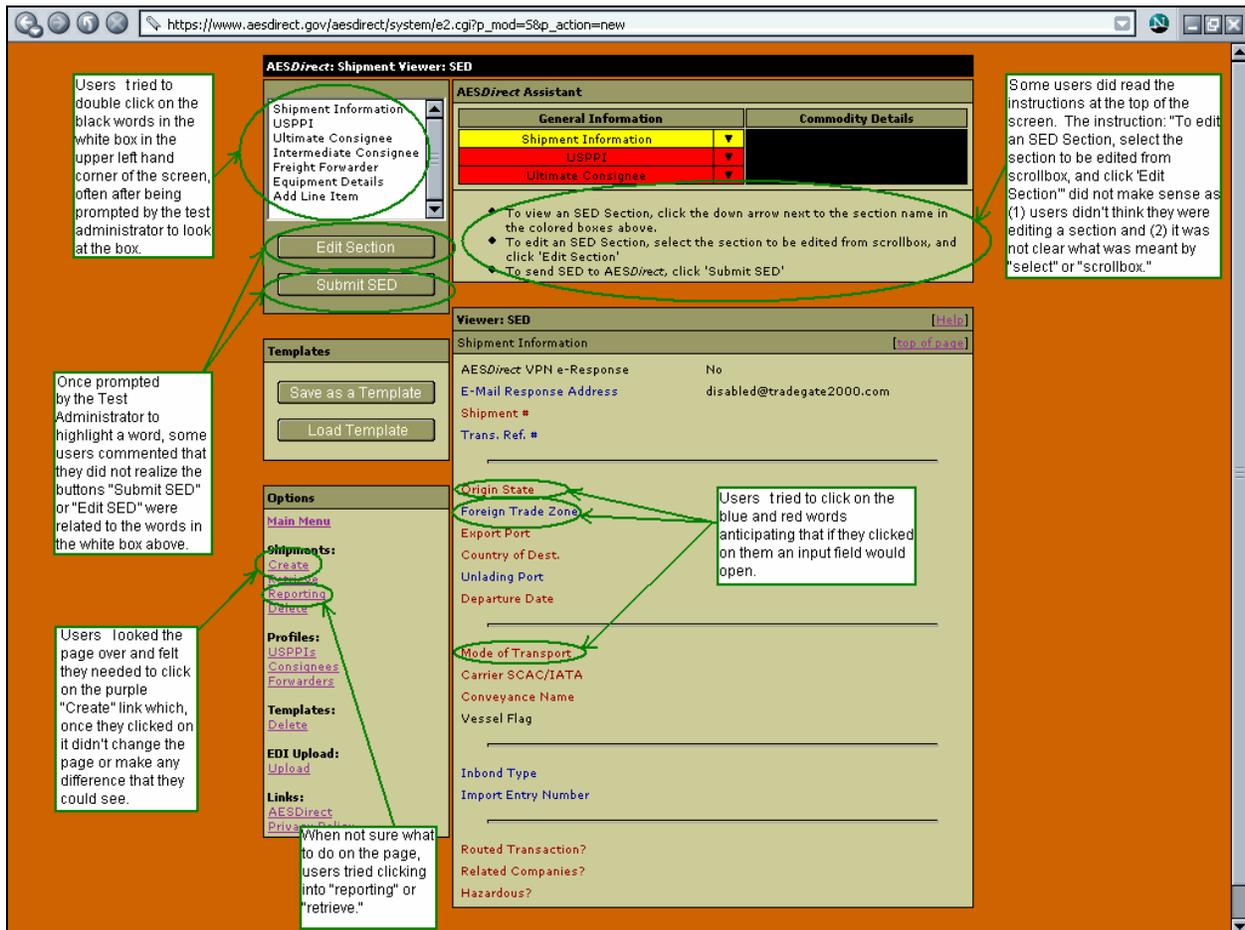
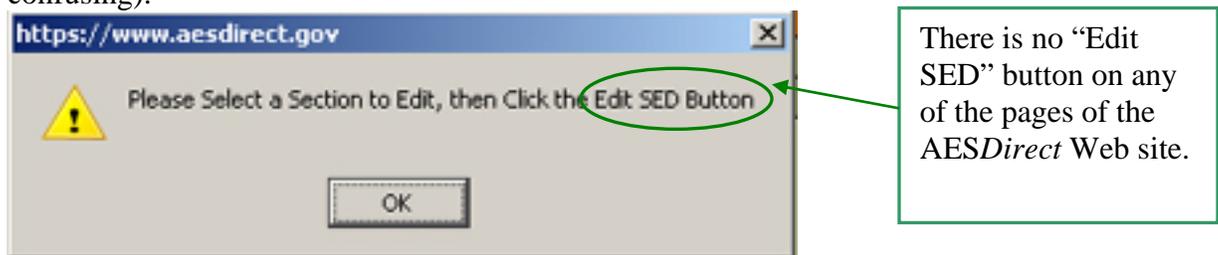


Figure 1. Usability findings: Screen shot of AESDirect Shipment Viewer. Participants in the usability study experienced many problems on this page including the most challenging aspect of how to get into the form (see [Appendix L](#) for a different view of the screen shots).

After clicking on the “Create New Shipment” link, participants experienced some or all of the following problems.

- A sense of being at the wrong place while looking at the page that opened.
- Looked the page over and felt they needed to click on the purple “Create” link which, once they clicked on it didn’t change the page or make any difference that they could see.
- Said they needed to have some input fields but didn’t see any and couldn’t figure out how to get them.
- Tried to click on the blue and red words anticipating that if they clicked on them an input field would open.
- Tried to click on the down arrow next to the words “Shipment information,” “USPPI,” or “Ultimate consignee.” The first one (in yellow) dropped the participant to the bottom of the page which didn’t help them, and in the case of the other two (in red) nothing happened, which was also confusing.
- Tried to double click on the black words in the white box in the upper left hand corner of the screen, often after being prompted by the test administrator to look at the box. Nothing happened and this confused the participants. This box also has a scroll bar regardless of whether the participant needs to scroll or not which adds extraneous noise to the box.
- Clicked “Edit Section” button without highlighting any of the words in the box above. When the warning read: “Please Select a Section to Edit, Then Click the Edit SED Button” (see Figure 2 below) participants often clicked OK without reading the warning or they were puzzled by what they read. One participant said he was confused because there was no “Edit SED Button” on the screen to click. (The button on the screen actually reads “Edit Section” which the participant has just clicked on. This error message does not match exactly what the participant sees on the screen and thus is confusing).



**Figure 2. Usability findings: An error window popped up after the participant clicked on “Edit SED” button before highlighting a section to be edited. There is no Edit SED Button on the screen.**

- Once prompted by the Test Administrator to highlight a word, some participants commented that they did not realize the buttons “Submit SED” or “Edit SED” were related to the words in the white box above.
- Said “Edit” was not a word that made sense to them because it implied that something already existed. Participants said perhaps it would be used in a situation when they needed to go into a pre-existing SED to make some changes, but not to create one.
- When not sure of what to do, some participants did read the instructions at the top of the screen. The instruction: “To edit an SED Section, select the section to be edited from scrollbox, and click 'Edit Section”” did not make sense as (1) participants didn’t think they were editing a section and (2) it was not clear what was meant by “select” or “scrollbox.” A few participants said they thought this instruction referred to the

“Shipment Information”, “USPPI”, and “Ultimate Consignee” color coded area with the drop-down arrows.

- Clicked on the link “Submit SED” because they said it was the only place on the page that they saw the acronym SED. This popped up a warning message which participants often didn’t read; but once they clicked the “okay” to close the box, they were automatically taken to the USPPI portion of the questionnaire. This confused participants because they didn’t expect it; however, most proceeded to fill it out.
- Couldn’t figure out how to start so turned to help. Help confused the participant because, while he had correctly taken the first step which directs one to “Click [the link] “Create New Shipment,” the other two points on help did not match with what the participant was seeing. Specifically the participant did not see a page with three input fields nor did the participant see any way to “Click Continue” as the last instruction on the help directed.
- When not sure of what to do on the page, participants tried clicking into “reporting” or “retrieve.” Some participants immediately felt this new page was not the correct place to be while others tried to find information on the shipment by clicking on the links at the bottom or searching by date.
- After prompting by the test administrator, or through sheer perseverance, many participants were able to use the white box to gain access to the questionnaire; however, a few participants never figured out how to work the box in the upper left hand corner and, thus, were not able to fill out any portion of the questionnaire.

#### **Examples from Video Recordings<sup>4</sup>:**

- A number of participants were on the SED Viewer page and wanted to enter information but they were not sure where to go to do this. Participants tried many different links, including the “create” link in the far left-hand navigation. After clicking on the “create” link, one surprised participant commented “it brought me right back to the top!” Some participants tried the “help” link but did not find the help instructions matched up with the SED Viewer screen.
- One participant clicking on the down arrow at the top of the page, she said, “it has brought me to the bottom of the page!” This was not what she expected or wanted. She ended up scrolling back up.
- There were several instances when participants in the SED Viewer clicked on the red and blue words because they thought they may be links that would take them into the form:
  - Participants hovered over red and blue words anticipating links
  - Participants asked if the blue and red words were links because they appeared to be clickable.
- Several participants clicked on the link “edit selection” without performing the unusual first step of highlighting one of the words in the scroll box above it:
  - A participant said after clicking on the “edit selection” that she expected an “opportunity to edit information.”
  - After being taken to the USPPI page, a participant clicked edit “because that's what it says to do.”

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<sup>4</sup> Because of Title 13 we do not attach the video highlights to this external version of our report. The video highlights are only for our internal clients to understand the magnitude of the usability issues the users experienced. We annotate them here so that the general reader can have some understanding of the detailed problems users were experiencing.

- In another instance, an expert participant said he was looking for the “Edit SED” button because that is what the pop-up window said to do.
- An expert participant explained that finding his way into the form was confusing in the beginning (when he first started used *AESDirect*) and at times he still finds it confusing, especially if some time has passed since his last visit to the site.

**Recommendation:**

*Short term:* There needs to be a more obvious and direct way for participants to get into and begin filling out the form. If you must keep the current navigation with the white box and the different parts of the questionnaire, change “Edit SED” to something more obvious such as “Start” or “Create SED” or “Open SED.”

*Long term:* A more extensive change, which would likely benefit the participant and could lead to better data quality, would be to have a more usable way to navigate through the form. This should go through low-fidelity prototype testing but could begin with some designs that offer a “Create” button which takes participants directly into the form with “Save” or “Submit” buttons at the bottom of the form.

Participants would not need to know which part of the form they were filling out nor would they need to know what was mandatory or conditional—this could all be done on the back end. When a section of the questionnaire was mandatory, participants would see the field and be able to fill it out. Thus, if something that had been conditional became mandatory based on a participants’ prior answer, when the participant hit submit for that screen, the new mandatory fields could be viewed and filled out.

In this way a participant would not have to learn the difficult concept of conditional nor would they have to learn what is currently a complex navigation for the questionnaire. The only action the participant would have to make would be to fill out the form and click links (or buttons) at the bottom of the screen such as “Next,” “Back,” “Submit,” and so forth.

It would be good to conduct low-fidelity usability studies on the proposed prototype designs. By doing this before any coding is done, you could more easily assure a usable product for all your participants.

### I.3.5.1.2 Filling out the form

Participants experienced many problems when filling out the form (Figure 3). These primarily occurred when participants came to a section of the form where they did not know what information was needed and had no idea how to go about getting the information.

Participants experienced some or all of the following problems:

- Did not know how to enter in the correct codes. Many participants tried to enter SW for Switzerland which was not correct but they said they had no idea how to get the correct code for the country. After guessing at the codes, many participants said they would like a way to get the code information easily, either in a table, a dropdown box, or a link right there next to the input field.
- Did not know how to enter the correct information. For example, many participants read “Shipment #” and were unclear what number to put in. Some participants looked to the invoice, others said they wondered what to put there, others tried to find the answer in the help. One participant in particular spent considerable time trying to find out what needed to go in the field and after downloading and going into the tutorial concluded that all he really needed was a simple one or two line explanation to “choose a unique code.” This left the participant very frustrated.
- After prompting by the Test Administrator, some participants tried to find the codes in other areas on the website. Those who eventually saw the link at the bottom left hand side of the page to “AES Codes” still had a difficult time of actually navigating and finding the correct code.
- Did not realize that L stood for “Look-up” and did not know that they had to use the “?” + Tab key to get into the look up field. (Even if they had, the look-up fields could be confusing—see footnote<sup>5</sup>.)
- Were not able to input in a field all the information they wanted to. For example, with the address entry fields, participants didn’t immediately realize that the address did not fit and once they did, participants said they were concerned both with how to shorten the address and if they did shorten it, they said they were uncertain if it would arrive at the correct destination. Other fields, such as the phone number did not have visual cues on how the number should be entered (though the visual cue was there for the date entry field). Thus if a participant tried to put in parentheses and dashes for a phone number they found that it did not fit.
- Did not know who the USPPI was supposed to be. One participant said “is this the TO or the FROM?” She said, if this type of information were on the screen next to the acronym, it would be clearer, and save her time.
- In the USPPI, Company section, for the Name entry point, some participants put in the individual name before realizing they were supposed to input the company name. One participant commented that it was because she didn’t immediately see the word “Company” in black and instead only read the “Name” which was written in red next to

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<sup>5</sup> While none of the participants realized that L was for look-up, [one of the researchers] tried it and found it somewhat difficult. For example, on the port codes, if a participant is unaware of what a port code is and tries “Washington DC”, they are given the error “string may not contain spaces, please try again.” If the participant tries DC alone, they find that they need to have “3 characters in the string.” And if they try Washington DC without any spaces they are told “no matches found.”

the data entry point. This same participant mentioned it would be more explicit if it read “Company name.”

- Did not know what the ultimate consignee was.
- Many participants did not make the connection that red was mandatory and blue was optional until late in the session. Once they did most just concentrated on filling out the red information and ignored the blue. Participants said they did not know what was meant by conditional.
- Had difficulty with the “Add Line Item” because they did not expect the information about the product (CD-ROMs) to be under “Line Item.” Participants said they expected this information to be more important and that “Add Line Item” sounded like extra or extraneous information. In addition after participants added a line item, not all of them realized that this then changed to a new label called “Line Item 1.” As happened with at least one participant, when she wanted to go back into her original Line Item she clicked on “Add Line Item” and without realizing it she had added another Line Item (Line Item 2). There was very little feedback that she had done this and in fact only realized after submitting when she had all kinds of errors on “Line Item 2.” The same participant then spent a lot of time trying to figure out how to delete the extra Line Item.

The screenshot displays the AESDirect Shipment Editor interface. The browser address bar shows the URL: <https://www.aesdirect.gov/aesdirect/system/e2.cgi>. The page title is "AESDirect: Shipment Editor: SED: Shipment Information".

**Left Sidebar:**

- Shipment Information
- USPPI
- Ultimate Consignee
- Intermediate Consignee
- Freight Forwarder
- Equipment Details
- Add Line Item

**Buttons:** Edit Section, Clear Section, View SED

**Options:** Main Menu, AES Codes

**Related Sites:** AESDirect, Privacy Policy

**Annotations:**

- A box notes: "Users did not realize that L stood for 'Look-up' and did not know that they had to use the '?' + Tab key to get into the look up field".
- Another box notes: "Many users did not make the connection that red was mandatory and blue optional until late in the session. Once they did most just concentrated on filling out the red information and ignored the blue. Users said they did not know what was meant by conditional." with arrows pointing to red fields like "Conveyance Name", "Vessel Flag (L)", and "Inbond Type".

**Right Panel: AESDirect Assistant**

- ◆ To return to the **Shipment Viewer**, click 'View Shipment'
- ◆ To **edit another section**, select the section in the scrollbar, and click 'Edit Shipment'
- ◆ To **delete this section**, Click 'Clear Section', and then return to the Shipment Viewer, or Edit another section
- ◆ Label Colors: **Mandatory**, **Conditional**, **Optional**

**Right Panel: SED: Shipment Information**

AESDirect VPH e-Response?

E-Mail Response Address: disabled@tradegate2000.

Shipment #

Trans. Ref. #

Origin State:

Foreign Trade Zone

Port of Export (L)  [Help]

Country of Desct (L)

Port of Unlading (L)

Departure Date

Mode of Transport:

Carrier SCAC/IATA (L)  [Help]

Conveyance Name

Vessel Flag (L)

Inbond Type:  [Help]

Import Entry Number

Is this shipment a **Routed Transaction**? [Help]  Yes  No

Are USPPI and Ult. Consignee **Related Companies**?  Yes  No

Figure 3. Usability findings: Screen shot of AESDirect Shipment Editor with form fields available to fill out; participants in the usability study had no idea how to enter codes.

### Examples from Video Recordings:

- Many users could not find the country code for Switzerland. A few participants recommended having the country codes right next to the input field.
- One participant spent more than ten minutes trying to figure out what information went into the Shipment Number field.
- In response to the question “what does the L mean to you?” a participant replied “it doesn't mean anything.”
- A participant tried to type in an address and ran into character limits. She could not type in the complete address and said that she was not sure if “the package will even get there.”
- A participant, after several attempts, discovered that there was a format to entering phone numbers.
- A participant entered in data to the USPPI section only to realize that she had put in the wrong information and points out that simply adding the words “TO” and “FROM” would have saved her “five minutes.”
- Some participants skipped the blue “conditional” items:
  - One participant went to enter information for a “port of unloading”, tried to type in “Geneva”, noticed a character limitation, and decided to skip the field because it was “optional.”
- An expert participant recommended putting help information right in the area where the person is filling out the form because from his perspective, “anything that will allow the person to click on the window where they are at to get as much information as they possibly can” will help.
  - Later the same expert recommended putting a question mark or an “i” right next to the field name.

**Recommendation:** For each data-entry point that could be confusing, consider offering additional information right next to it within the form. The additional information could be in a link such as “What is this?” and “How to find it” or “Look up x” located to the right of the data entry field (see Figure 4 below). Thus the participant could click on it if needed. One link could explain what information is required. Another link could be to a list of codes for that particular item.

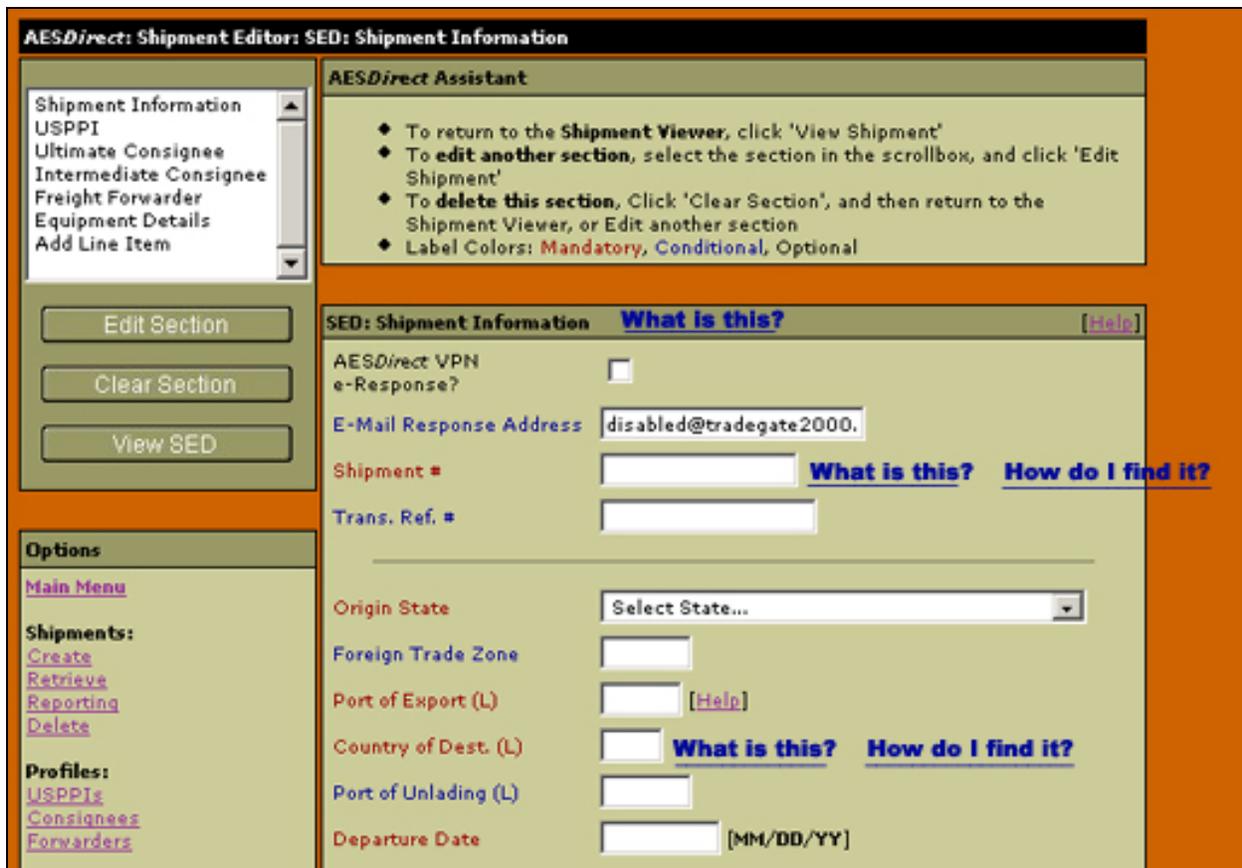


Figure 4. Usability findings: A mocked up example of the usability recommendation to annotate some of the fields with help links that read: “What is this?” “How do I find it?”

For mandatory fields, participants said they were more familiar with seeing a red asterisk next to the item that was mandatory. Participants also mentioned that they thought the word “required” was more common. A few participants mentioned that they had seen the red required/asterisk frequently when filling out forms that asked for credit card information.

Allow more room to enter entire addresses, especially as foreign addresses differ from US addresses. Allow participants to input the phone number any way they chose and/or put in visual cues (similar to what exists for the date-entry fields) for how the phone number should be entered. If you allow the extra space for the parentheses and dash common in phone numbers, this could reassure the participant; and behind the scenes, the computer system could simply remove those characters for data storage.

Change the wording from “Add line item” to something more intuitive for the participants. Consider changing it to “Commodity” and for additional commodities you could say “Add another commodity” or “Add new commodity”

*Short term:* For all the different portions of the questionnaire (e.g., shipment information, USPPI, Ultimate Consignee, Add Line item), you could add a simple explanation in plain

language of what each section is. This could assist participants in knowing what information to input. One participant mentioned that the acronym USPPI had no meaning but if next to it there was the information (From/Exporter) or something along those lines, it would have been more clear what information she needed to enter.

For the white box with entry to different sections of the form—don't add a scroll bar until the window requires a scroll. This might be a cue to the participant that something has been added and that they need to scroll to view it.

*Long term:* If you move away from making the participant navigate through different sections of the questionnaire (see Finding 1 above), this problem could potentially go away.

### **I.3.5.1.3 Submitting and saving data**

Participants experienced problems when trying to save the form they were working on and move onto the next section. Most participants expected to see some feedback that they were submitting the input data and that it was being saved. Almost all participants who worked with any section of the form said they expected to see something like a “Submit” button at the bottom of the data-entry form. When they did not see this, they looked around for what to do next. Some participants were able to figure out how to move on, while others said they were completely lost on what to do and were very frustrated that all the information that they had just entered might be lost. Participants said they had no confidence that the information would be saved, and for those participants who clicked on “Create” again, it was not, in fact, saved.

#### **Examples from Video Recordings:**

- A participant filled out needed fields and expected a submit button. When she did not see one she said she would go to “create.” She lost all the information she had just entered and was very frustrated.
- Towards the end of lengthy session a participant did not know how to submit his electronic SED.
- A participant said he preferred to have a submit button on the bottom of the page.

#### **Recommendation:**

*Short Term:* Put a “Next” button at the bottom of each form, which would have the same effect as the current “View SED” does now. You could also put in a “Back” button which could take them back to the previous screen.

*Long Term:* Change the navigation through the form to be more consistent with other currently available forms: either one long scrolling form or a paging form with navigation buttons at the bottom of the screen, such as next, back and submit. This would move participants through the form without requiring them to learn the current complex navigation system or to know the different sections of the form.

### I.3.5.1.4 Using help

At different times during the sessions, participants turned to “Help.” The help often was not useful because the content frequently did not match with what the participant needed to do. For example, the help for “Create a New Shipment” does not match with what a participant needs to do to get started. The help under “Create a New Shipment” reads:

- On the AES*Direct* Main Menu, Click “Create New Shipment”.
- A new page will open with 3 input fields, USPPI Code, Consignee Code, and Shipment Number. All three of these fields are optional at this point, but entering them here saves time later.

**USPPI Code:** Enter the code for the USPPI you wish to submit an SED for. USPPI Codes must set up separately and cannot be used until they have been. Lookup is available on this item.

**Consignee Code:** If this shipment is for a consignee that you have already entered for this USPPI, you can enter the consignee code for that consignee. Lookup is available once an USPPI Code is entered.

**Shipment Number:** Enter the shipment reference number that you wish to use for this shipment. This is your own reference number and should be unique for 5 years.

- Click "Continue"

After the participant clicks “Create New Shipment” a new page opens, but as far as the participant is concerned there are no input fields on it, and there is no “continue” to click. This was very confusing for one participant who basically didn’t have any faith in the system after realizing that the help did not match what he was seeing on the screen.

In addition, the location of some of the purple Help links implies that they will give code information, e.g., the port of export code, or the carrier codes. Once participants saw they needed a code, they immediately clicked on the available Help link. Participants said they thought this would open a list of codes. When it didn’t, they were frustrated and confused on what to try next.

Further, the Help on specific fields of the form offered information on the exceptions rather than on actually how to fill out the questionnaire. So when a participant clicked on the help link thinking they were going to get code information, instead they opened what they were supposed to input in “a last resort.” Participants either didn’t read carefully and input one of “the last resort” codes, or if they did read it carefully said they were lost and didn’t know how to input the correct code.

Finally once in the Help, the navigation could be slightly confusing. For example, when reading the information in Help, participants sometimes clicked “Next” or “Back” thinking they would be getting more information about the current topic and instead they were taken into a new Help topic without their realizing it. Once on the new topic they would appear confused and often closed the Help saying it wasn’t useful.

### Examples from Video Recordings

- Several participants complained that the “help” does not match the page/does not help.

**Recommendation:** Have the Help content match the action that the participant is required to make. For task oriented help (like Create New Shipment), you could lay it out in Step-1, Step-2, Step-3 fashion with simple bulleted directions on what the participant needs to do. Make sure whatever is in the help actually appears on the screen. Pull content directly from the “Overview” document, which, we have been told, answers many of the participants’ questions, and make it available at the point when participants are filling out the field. By taking away the need for a participant to navigate and providing the help at the exact location that they are at will go a long way towards alleviate frustration and increasing the speed and accuracy of filling out the form.

If you have help links right next to code fills, have the help contain the codes. If you want the help to remain for exceptions, make it more obvious where the participant can go to get the rule such as with a “What’s x?” and a “How to find x” (e.g., What is port of export?/How to find your port of export.)

#### **I.3.5.1.5 Recognizing Links**

Participants experienced some confusion about knowing which words were actually links. Many of the links were in a purple color which, for many participants, indicated a visited link. In addition participants tried to click on the colored words (blue, red, and black) as they thought it possible that these were links into the form.

**Recommendation:** To simplify navigation, consider using the Web-standard link colors throughout the site where

- Unvisited Links: Underlined Blue
- Visited links: Underlined Purple

#### **I.3.5.1.6 Understanding Technical Terminology**

Participants commented again and again on the excessive amount of technical jargon they were confronted with throughout the Web site. (See Figure 5.) Acronyms were not defined. Even if they were defined, it’s questionable whether that would have helped (e.g., USPPPI stands for U. S. Principal Party in Interest, which could be just as confusing as the acronym). Many participants commented that they were confused by the expert level terminology, the abbreviations and the acronyms. Participants in general said they just didn’t know what the form was saying or what exactly they needed to do.

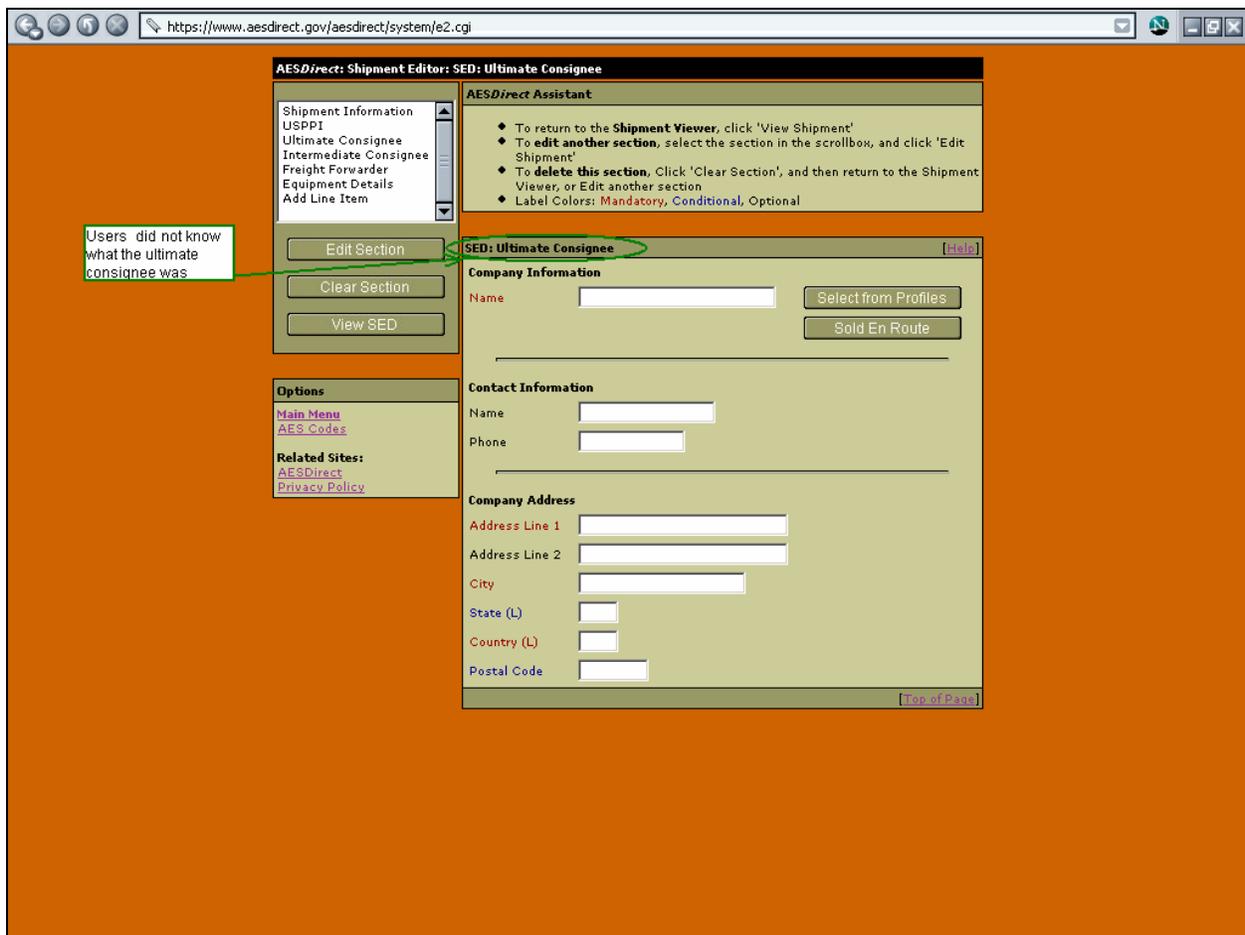


Figure 5. Usability findings: Screen shot of AESDirect Ultimate Consignee form; participants in the usability study didn't know who or what the Ultimate Consignee was.

### Examples from Video Recordings:

- Several participants were frustrated with the abbreviations and acronyms that appear throughout the form:
  - One said that the abbreviations (SCAC, IATA) meant “absolutely nothing” to her.
  - Another said he had no idea what a USPPI was.
  - Another was confused by wording in the help screen. She said it “makes no sense to me.”
  - A participant didn't know the meaning of “related companies” and said she was really not sure what it was and laughed, “I just read a foreign language!”

**Recommendation:** If you must include the acronyms, also include more informative information in layperson language (e.g., explain to the participant what a USPPI is in plain English, add in words like to and from, or if this is too simplistic add in a sentence that USPPI is the person gaining monetarily from selling/sending the product. Include a link to the regulations and/or a phone number). Use plain English throughout the site. Adding in simple instructions such as “What's This” or “How to Find x” (see example in Figure 4 above) could serve as clues for the complex or expert terminology. This could

help the novice participants and would not likely distract the experts. As with all our recommendations and before any significant changes take place, we recommend running the design interface ideas past participants to get their impressions and feedback. Usability lab services are available for assistance in this area. We call this low-fidelity prototype testing.

### **I.3.5.1.7 Submitting the SED**

Once participants made it to the point where they were ready to actually submit the SED and get the confirmation number they were invariably shown a pop-up window with a list of problems that they needed to fix. The pop-up window was low in usability because it could not be printed, viewed all at once, or resized.

We identified the following usability problems with the content:

- The list of problems changes constantly (When a participant added in new and different information on the various forms the list of problems would increase, rather than decrease.) This confused one participant who said she would have preferred if it had just listed out *all* the problems with the form at once rather than piecemeal. She said she felt as though she was trying for a “constantly moving target.”
- A lack of clarity about which problem was associated with which portion of the form.
- Users expect to be able to click on the problem and be taken back into the form to correct it, this functionality was not provided.

#### **Examples from Video Recordings:**

- A participant, when reviewing the list of problems he got after submitting the SED said he did not find “any direction on how I can correct that mistake.”
- Another participant said that she was not happy with the results she got after submitting the SED.

#### **Recommendations:**

*Short term:* Allow participants to print and resize the pop-up window. In this way participants could more easily view the problems and be able to check them off once they have corrected them.

Allow participants to have the list of problems open on their desktop at the same time that they are working on correcting the form.

List out all the problems that need to be dealt with before submitting the SED. If participants have not answered questions for a particular section (likely because they didn’t realize that they needed to fill out that section), the problems could be listed in a different font/color with the cue that these are problems because the section of the form wasn’t filled out.

*Long term:* If the interface changes so that the participant fills out one form in the paging or long scroll format mentioned above (see Finding 1) rather than navigating through by

section, the participant may not have the issue of unknowingly skipping sections of the form.

If the form changes to a paging one, after each time the participant clicks “Next” to move onto the next screen of questions, the data they had entered could be sent immediately to the server and any problems with the data (e.g., missing data) could be automatically checked, and at that point the same page could be sent back to the participant with the edit messages appearing in the places where the participant needs to fix something. In addition a final check with all the outstanding problems could appear at the end.

Allow the participant to be able to click on the list of problems and gain access to, and fix, the problem.

### **I.3.5.2. Low priority usability issues**

The following low-priority usability problems deal with different warning messages that popped up at various times during the session.

#### **I.3.5.2.1. Browser Update Pop-up**

The Browser Update Pop-up window warning about not having the most recent browser window was slightly annoying for participants. However they quickly skimmed it and then closed it or clicked off it. It did not stop them from the task at hand.

#### **I.3.5.2.2. Entering Government Website Pop-up**

Participants commented briefly that the “Entering Government Website” Pop-up window warning message was slightly daunting or that it was clear that they were now entering a government website. This occurred as the participants proceeded onto the main page of *AESDirect*. For users these pop-up windows and warning messages were not a problem but something that caused them to pause slightly and then move on.

#### **Examples from Video Recordings:**

- A participant commented on the pop-up window warning about not having the most recent browser. He asked, “Why is it popping up all the time?” He continued, “it’s just very annoying.”
- A participant commented on the “entering a government web site” message. She said, and ended with a laugh, “It says I accessed a United States Government computer and you go blah blah blah and you push continue because you don’t really care about that.”

#### **I.4. Implications of Usability Findings for User Interface Designers**

Based on user performance and commentary during the think aloud, we were able to identify a number of problems and offer recommendations that could make for a better design of the CSAQ. By far the most challenging element for the users was simply getting into the form and understanding how to fill it out. Users floundered without knowing the direction they needed to go in and when they finally turned to the HELP, often as a last resort, they found in was not useful. Thus, implementation of the primary recommendation to offer guided help throughout the entire form filling process is central to the success of the CSAQ.

Guiding users could take many forms but some of the more immediate uses follow:

- Cue users in how to progress onto next screen or section of the form (e.g., place obvious next, back, and submit buttons at strategic points, such as at the bottom of each section of the form)
- Offer additional linked information at each data entry point that could be confusing (e.g., “What is x?” and “How to find x.”)
- Use terminology and words that users know and understand (e.g., plain language, as opposed to technical jargon (acronyms), can guide users to where they are and where they need to go)

Each of the usability recommendations can be generalized to other user-interface design contexts and can remind designers to consider user needs in all their design activities.

## **Part II: Evaluation of Accessibility for AESDirect**

### **II.1 Introduction to Accessibility Testing**

Since June 2001, Federal regulations have required that U. S. Government Web sites and other software developed by or for the U. S. Government provide comparable access to the information for all users<sup>6</sup>. Computer users who have visual and or other disabilities are entitled to have the same access as users who do not currently have any disabilities

Some practitioners consider accessibility to be a subset of usability, while others think of accessibility as related, but separate from usability. Accessibility guidelines have several checkpoints that address more general usability, such as a logical tab order, dividing large information blocks into more manageable groups, and using the clearest and simplest language appropriate. Even if the application complies with the regulation, it still may not be usable, as the Census Bureau's Usability Lab has found in other testing. Both usability and accessibility testing need to be done to identify problems that actual users may have.

### **II.2 Background to Accessibility Testing**

This accessibility evaluation was performed on the AESDirect Shipment Export Declaration web application, the installation wizard for AESDirect tutorial, the AESDirect tutorial, the AESDirect Certification Quiz, the WebLink application, and the AESPcLink application. The Foreign Trade Division (FTD) requested that the Statistical Research Division (SRD) use its expertise to verify and/or identify accessibility problems in the SRD accessibility lab. These applications enable persons exporting goods to take training and use AESDirect or AESPcLink to declare their value for tracking purposes by U. S. Government agencies.

### **II.3 Purpose of Accessibility Testing**

The purpose of this evaluation is to report and rate the severity of accessibility problems to the developer of the software so that the problems can be resolved. The priority for accessibility problems is rated high, medium, or low. An item flagged as high means that the user could not perform the task at all. An item flagged as medium means that the user could perform the task, but with difficulty. An item flagged as low priority means that the user is not presented the same information as the able-bodied user, but can still perform the task.

### **II.4 Scope and Method of Accessibility Testing**

This evaluation is primarily focused on testing accessibility for computer users with visual disabilities. Accessibility testing is performed using the Job Access With Speech (JAWS) 7 screen reader software<sup>7</sup>. For the purpose of this report, an item is judged to be accessible (compliant with the regulations) if its screen text is read out loud, in a coherent order by JAWS. Usability problems are detected by listening to the content vocalized by the screen reader and visual inspection by a person experienced with usability. These problems are included in this report as issues to evaluate in formal usability testing.

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<sup>6</sup> <http://www.section508.gov/index.cfm?FuseAction=Content&ID=3>

<sup>7</sup> <http://www.freedomscientific.com>

## II.5 Accessibility Findings

Findings for *AESDirect* are detailed in Figures 6-18, followed by the Certification Quiz (Figures 19 and 20), the tutorial installation wizard and tutorial (Figures 21-23), the User Guide (Figures 24-26), *WebLink*(Figures 27-33) and *AESPcLink* (Figures 34-42). These applications have the following accessibility issues:

- Navigational skip links, for bypassing navigation links to access screen content, are not used.
- Graphics containing text are not accessible.
- Color is used by itself to identify completion status.
- Tutorial installation screens have inaccessible text.
- Screen shots within the *AESDirect* user guide do not provide alternate text describing the contents on the screen.
- The *AESDirect* tutorial text is inaccessible and keyboard commands do not function as expected.
- *WebLink* lookup screens have inaccessible labels and buttons.
- *AESPcLink* lookup screen search results are displayed in inaccessible tables.

During the process of accessibility testing, these usability problems were detected:

- All links are purple, even when visited. Links should change color, from blue to magenta (purple).
- Graphical bullets are used instead of text bullets, which made traversing the screen take longer than necessary and did not add value.
- Graphical links appearing as buttons are vocalized as variable names instead of the link text.
- The “AES” part of the words *AESDirect* and *AESPcLink* sounds like “aze”.
- Spelling errors cause the screen reader to mispronounce words.
- Abbreviated words are hard to understand when vocalized by the screen reader.
- When data are entered into a field within the *WebLink* application, all the following labels announced by the screen reader software with the same label.
- Two screens within the *AESPcLink* application require the user to scroll down to enter data. If the user does not see the instruction to scroll down, he or she may miss entering some data.
- After searching for a code on a lookup screen and returning to an edit shipment screen, the screen reader can only detect the last word in a multi-word label for data-entry fields.

## II.6. Findings and Recommendations to Improve the Accessibility of the AESDirect Web Application

The screenshot shows the AESDirect web application interface. The browser title is "AESDirect - Reduce Exporting Stress with AES - Microsoft Internet Explorer provided by America Online". The address bar shows "http://www.aesdirect.gov".

**Finding 1:** Points to the left vertical menu, which contains a list of links for navigation, including "Log in", "Account Set-up & Management", "Vendor Account Set-up", "Training", "Using AESDirect", "AESpCLink", "AESDirect VPN", and "Related Sites".

**Finding 2:** Points to the "Welcome to AESDirect" text in the main content area.

**Finding 3:** Points to the "New to AESDirect" text in the main content area.

**Finding 4:** Points to the "AESDirect Products" section, which lists various services and their features.

The main content area includes a "Welcome to AESDirect" message, a "New to AESDirect" section, and a "Need Training?" section with links to "AESDirect Tutorial", "User Guide", "Online Training", and "In-person Training". The "AESDirect Products" section lists "AESDirect -- Online Internet Filing System", "AESpCLink -- PC-based Filing Software", "AESWebLink and EDI Upload -- Other Ways to Transmit to AESDirect", and "AESDirect VPN Service -- A More Secure Connection on the Internet".

Figure 6. Accessibility findings: The AESDirect portal screen has inaccessible text and no skip navigation to bypass the left vertical menu.

**Finding 1: Graphical bullets are used for the navigation links instead of text bullets. (Global)**

Priority: Low

This is not a Section 508 regulation violation. However, the presence of a graphical bullet preceding each navigation link makes tabbing through the screen take much longer than it should because the screen reader announces “graphic” each time the focus is placed on the bullet.

Recommendation: The graphic bullets are not meaningful and should not be vocalized by the screen reader. Set alt = “” for each graphic bullet so the bullets will not be detected by the screen reader.

**Finding 2: No skip links are used. (Global)**

Priority: High

The left vertical navigation bar did not have skip links as per 1194.22 paragraph O of the Section 508 regulation.

Recommendation: Skip links allow a screen reader user to bypass unwanted content to quickly access content related to their current task. Web applications must have skip links to be compliant with Section 508. Place a one-pixel transparent graphical link prior to the navigation bar and have it link to a screen element immediately following the last navigation bar element. The graphical link should have alt text providing users of screen readers the option to skip the navigation bar, such as “Press enter to skip left navigation bar.”

**Finding 3: Two headers are inaccessible.**

Priority: High

The two headers identified on this screen are images of text. The screen reader did not detect the header text. Images must have text describing them as per 1194.22 paragraph A of the Section 508 regulation.

Recommendation: Images have an alt attribute by which text can be entered to describe the image. Alt text should be assigned to each of the images. Going from the top of the screen, set alt=“Welcome to A E S Direct” and alt=“A E S Direct Products”, respectively, for the headers. The spaces between the capital letters in the text string are inserted so the screen reader will pronounce AESDirect correctly.

**Finding 4: Links are purple, making them all appear as if they have been visited previously. (Global)**

Priority: Low

This is not an accessibility violation. However, the standard for hyperlinks is for them to be portrayed in underlined blue before the user clicks on them. When a link has been visited, the color is supposed to change to purple. This convention helps users who can see tell which links they have clicked on.

Recommendation: Throughout this web site define the color of the hyperlinks to underlined blue that changes to purple when visited. Use the development software to make these corrections.

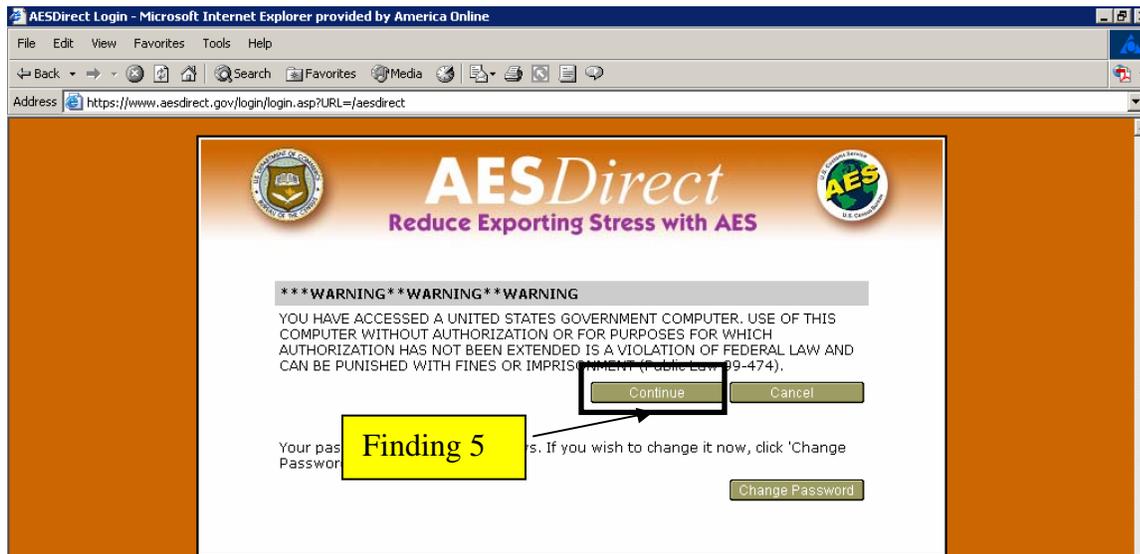


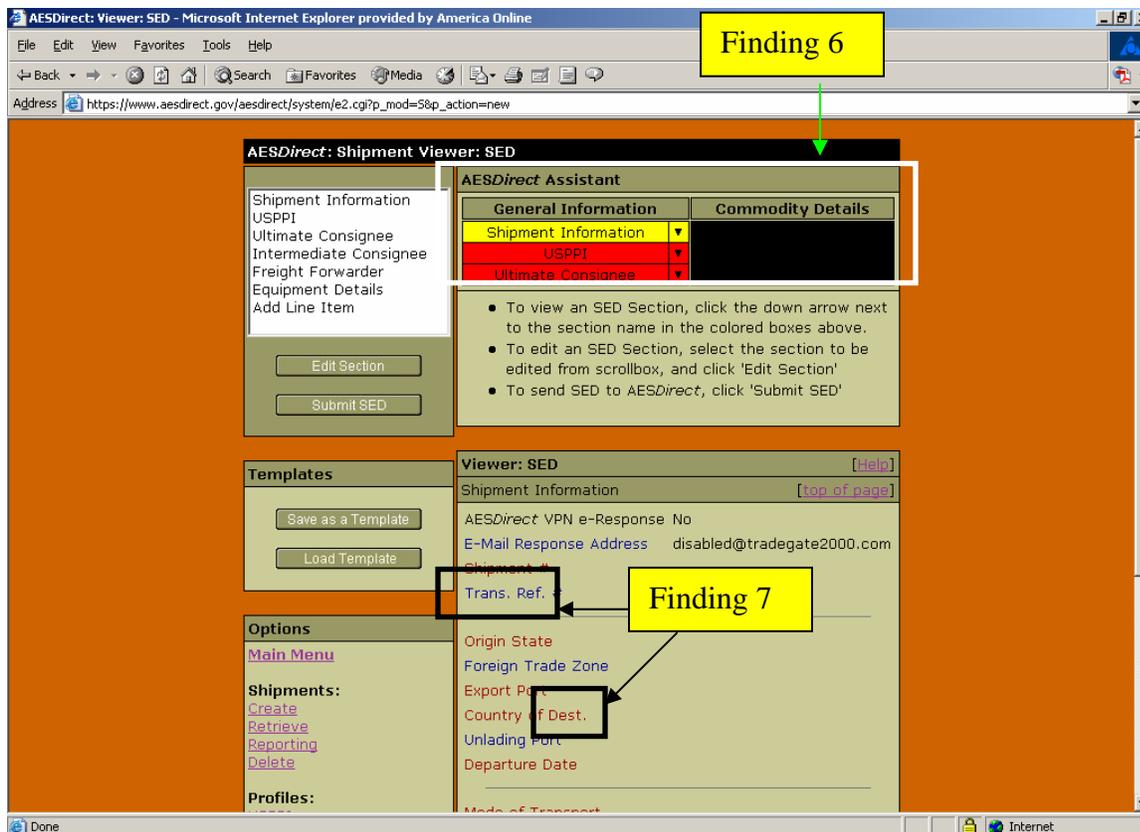
Figure 7. Accessibility finding: The login warning screen “continue” button is not labeled correctly.

**Finding 5: The “Continue” button is not labeled with the same text as displayed.**

Priority: High

The button is vocalized as “pix/button\_continue” which is a variable name, not the label text. The screen text should not differ from the button title as per 1194.21 paragraph A of the Section 508 regulation.

Recommendation: The screen reader user should hear “Continue” when tabbing to this link button. Set the hypertext to “Continue” using the development software.



**Figure 8. Accessibility findings: The shipment viewer screen uses inaccessible colors to show completion status.**

**Finding 6: Color is used to identify completion status in the AESDirect Assistant and Viewer: SED panels.**

Priority: High

Color is used by itself to identify the completion status of form sections and data items. Screen reader users, persons with low vision, and persons with a color deficit would not be able to determine the completion status of a form section or data item. Information conveyed with color must be available without color, as per 1194.22 paragraph C of the Section 508 regulation.

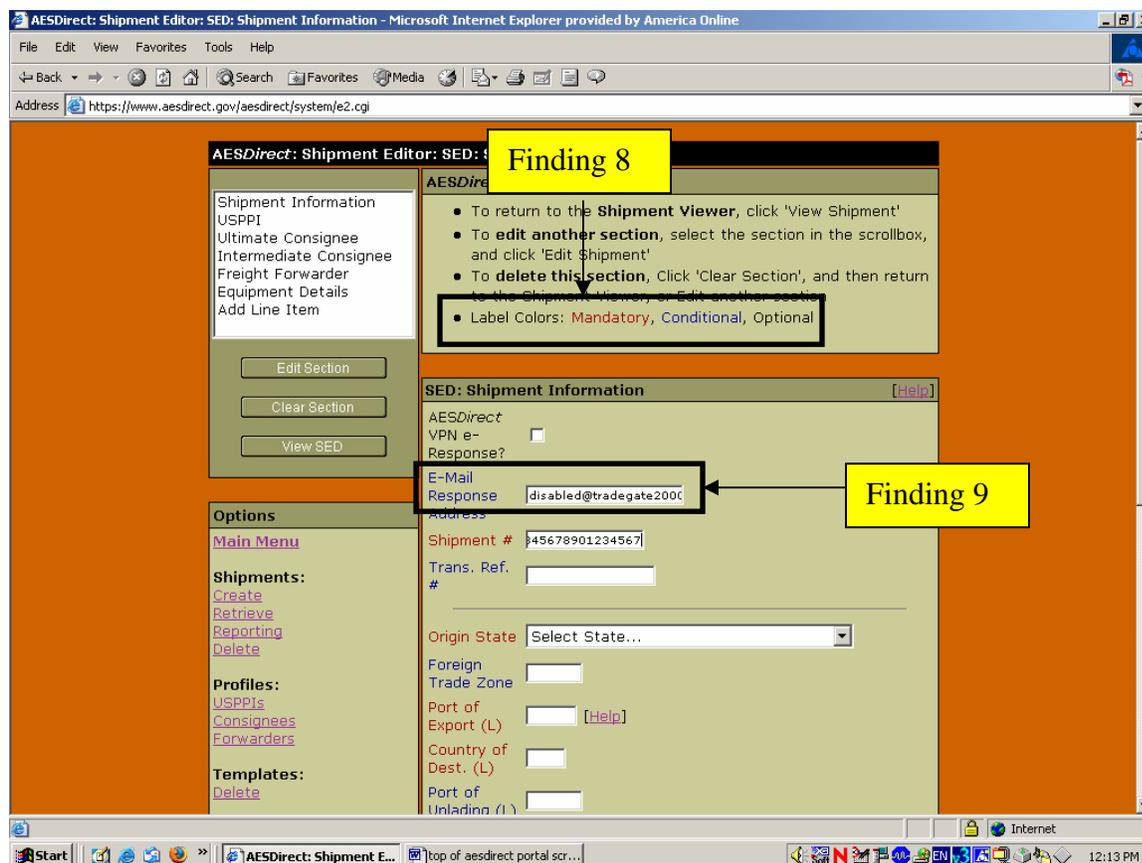
**Recommendation:** Use black for all labels. Mandatory fields should include a “\*” as part of the label text. Subject matter experts should meet and determine AESDirect business rules for usage of conditional data-entry fields. The changes can be performed with the development software.

**Finding 7: Abbreviated words are difficult for screen reader users to understand.**

Priority: Low

This is not a Section 508 regulation violation. Although a person with full vision could determine what the full words should be by context, the screen reader user only has available the words being spoken. Screen reader users would need to go back and listen to abbreviations at least another time to determine meaning. For example, “Trans” could mean “Transfer”, or “Trans-Atlantic” as well as “Transportation”.

Recommendation: Spell out the abbreviated words. There is no need to abbreviate these entries because there is adequate room on the screen. Use the development software to make this correction



**Figure 9. Accessibility findings:** The Shipment information screen uses colored labels to identify completion status without providing the same information without color, and the AESDirect VPN e-response checkbox is inaccessible.

**Finding 8:** An instruction about label colors does not have the same information available without color.

Priority: High

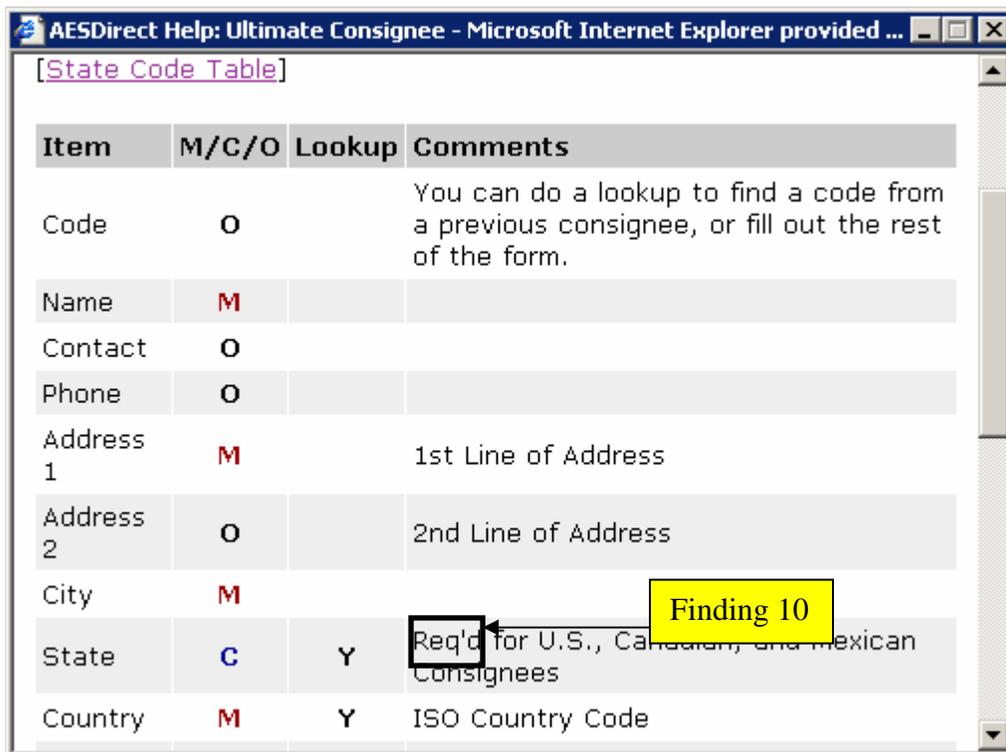
Color is used to identify the completion status of form sections and data items. Screen reader users, persons with low vision, and persons with a color deficit would not be able to determine the completion status of a form section or data item. Information conveyed with color must be available without color, as per 1194.22 paragraph C of the Section 508 regulation.

Recommendation: Use black for all labels. Mandatory fields should include a “\*” as part of the label text. Subject matter experts should meet and determine AESDirect business rules for usage of conditional data-entry fields. The changes can be performed with the development software.

**Finding 9: Focus is put on the E-mail Response Address field, bypassing the AESDirect VPN e-Response checkbox, upper left list box, left navigation bar, and instructions.**  
Priority: High

Screen reader users do not have the same access to directions and the option to receive an email response as persons with normal vision. The screen reader did not vocalize the label for the e-response check box. The skipped elements and the missing check box label both violate 1194.22 paragraph N of the Section 508 regulation.

Recommendation: Place the cursor focus on the upper left list box and associate the check box label with the check box. The changes can be accomplished with the development software.



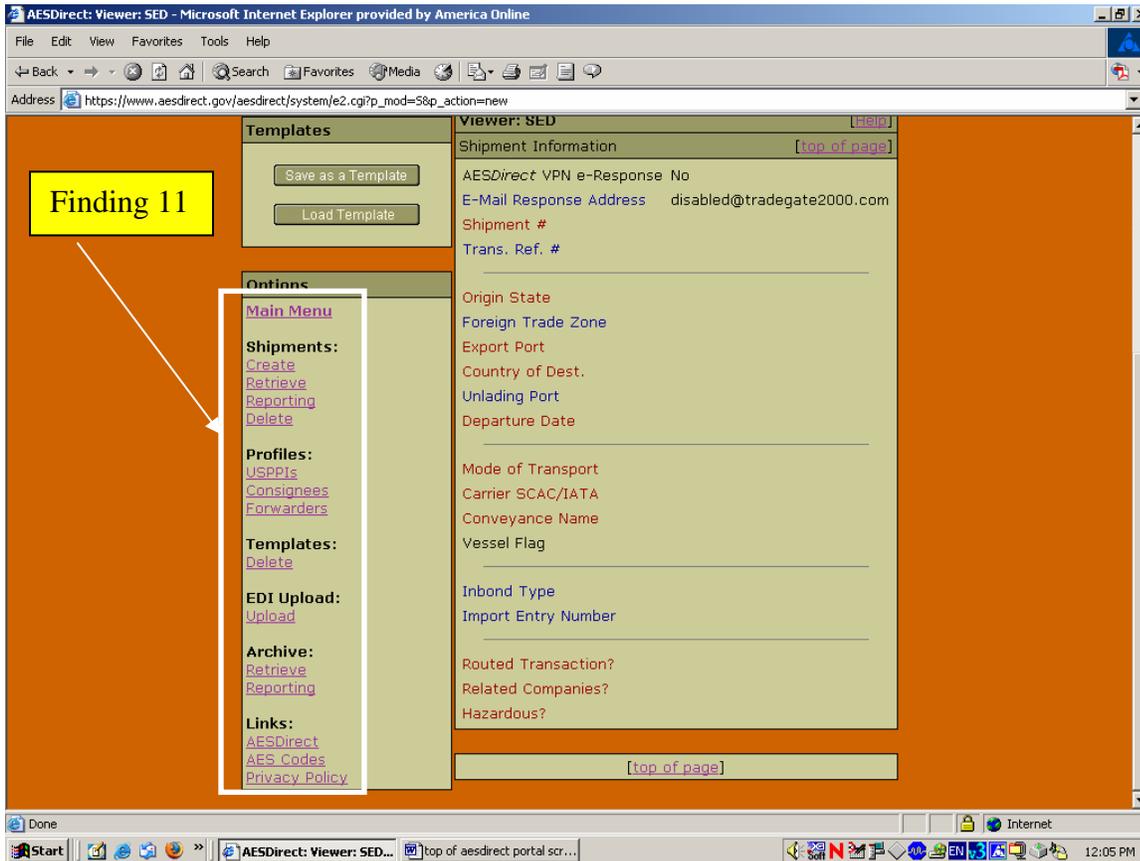
**Figure 10. Accessibility finding: The AESDirect help pop-up window uses abbreviations which are hard to understand when spoken by the screen reader.**

**Finding 10: Abbreviated words are difficult for screen reader users to understand.**  
Priority: Low

This is not a Section 508 regulation violation. Although a person with full vision could determine what the full words should be by context, the screen reader user only has available the words being spoken. Screen reader users would need to go back and listen to abbreviations at least another time to determine meaning.

Recommendation: Spell out the abbreviated words located throughout Help, which include “Required”, “License”, and “Schedule” The “#” symbol is vocalized as “pound”. If number is

the intended meaning for “#”, then spell out “number”. Use the development software to make this correction.



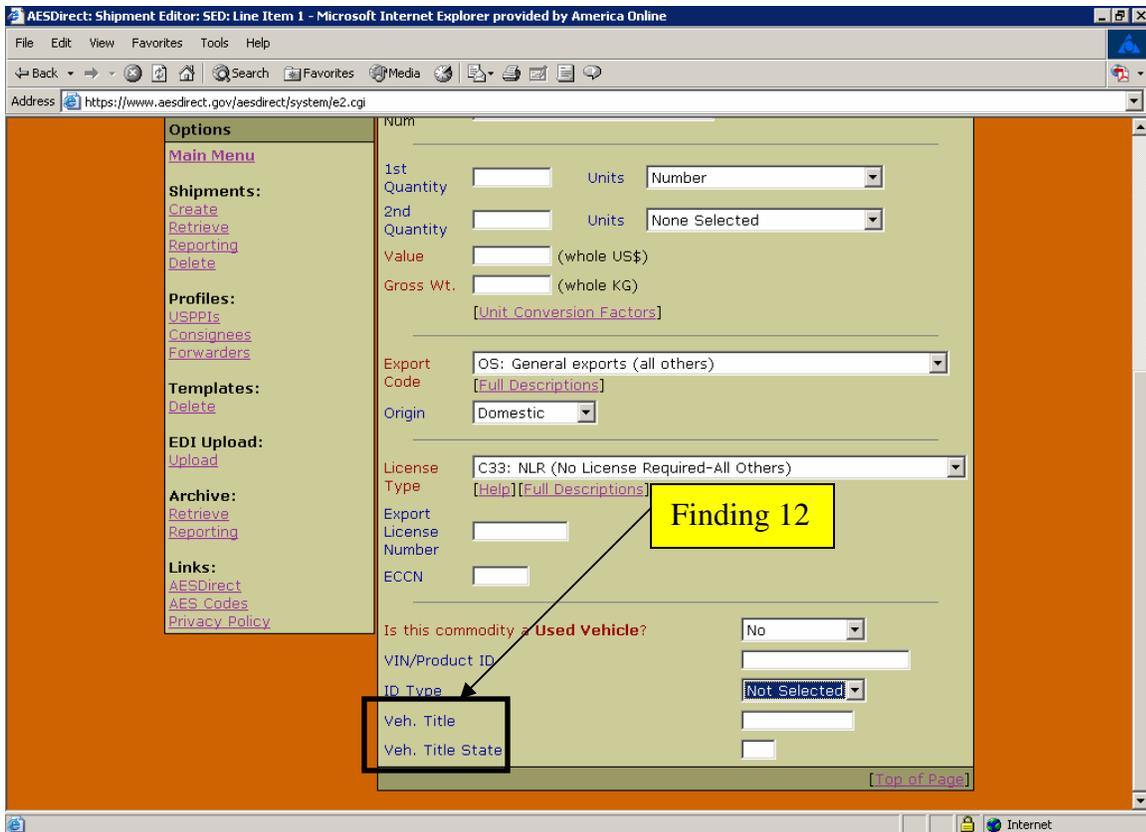
**Figure 11. Accessibility finding: The bottom of the shipment viewer screen has a navigation menu that does not have skip navigation.**

**Finding 11: No skip links are used.**

**Priority:** High

The left vertical navigation bar does not have skip links as per 1194.22 paragraph O of the Section 508 regulation.

**Recommendation:** Skip links allow a screen reader user to bypass unwanted content to quickly access content related to their current task. Web applications must have skip links to be compliant with Section 508. Place a one pixel transparent graphical link prior to the navigation bar and have it link to a screen element immediately following the last navigation bar element. The graphical link should have alt text providing users of screen readers the option to skip the navigation bar, such as “Press enter to skip left navigation bar.”



**Figure 12. Accessibility finding: The bottom of the Line item 1 screen uses abbreviations that are hard for screen reader users to understand.**

**Finding 12: Abbreviated words are difficult for screen reader users to understand.**

**Priority:** Low

This is not a Section 508 regulation violation. Although a person with full vision could determine what the full words should be by context, the screen reader user only has available the words being spoken. Screen reader users would need to go back and listen to abbreviations at least another time to determine meaning.

**Recommendation:** Spell out both instances of “vehicle”. Use the development software to make this correction.

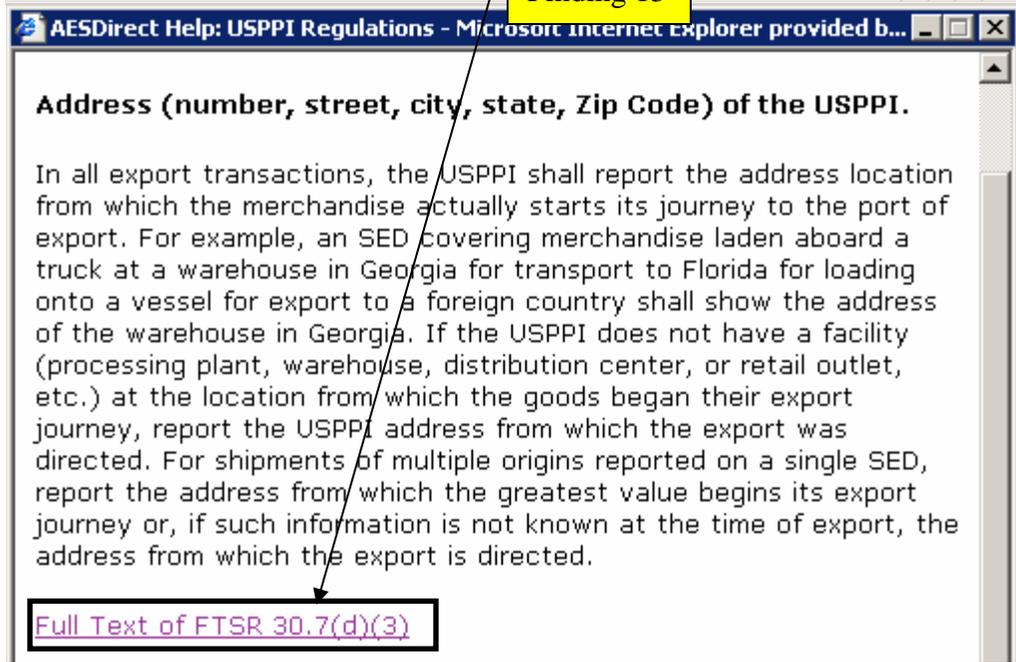
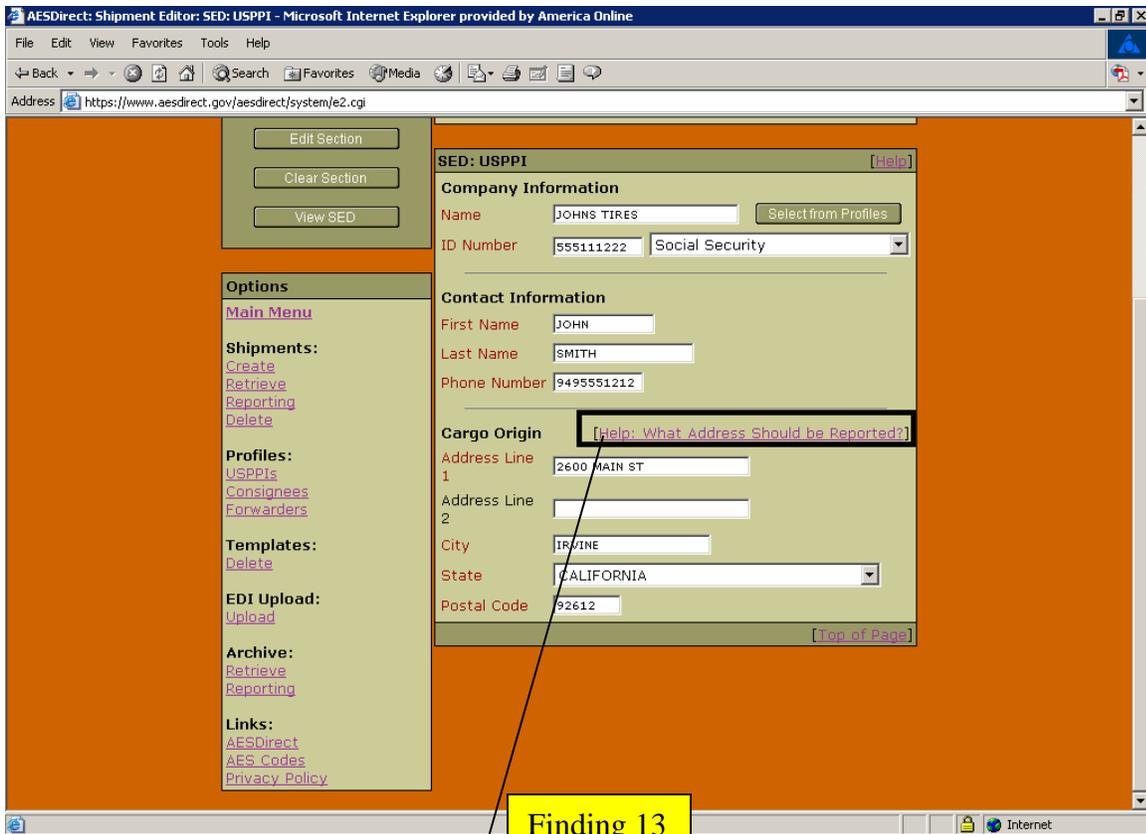


Figure 13. Accessibility findings: The help pop-up associated with the USPPPI screen does not have a link to download the Adobe Reader for the PDF document.

**Finding 13:** No link is present to download the Adobe Reader to access PDF content.  
 Priority: High

Presence of a PDF document requires a link to download the Adobe Reader as per 1194.22 paragraph M of the Section 508 regulation.

**Recommendation:** Place a link to the Adobe Reader at the bottom of the help pop-up. The document should have (PDF) as part of the hyperlink text so that users will be aware that the document is a PDF file type. Use the development software to make this correction.

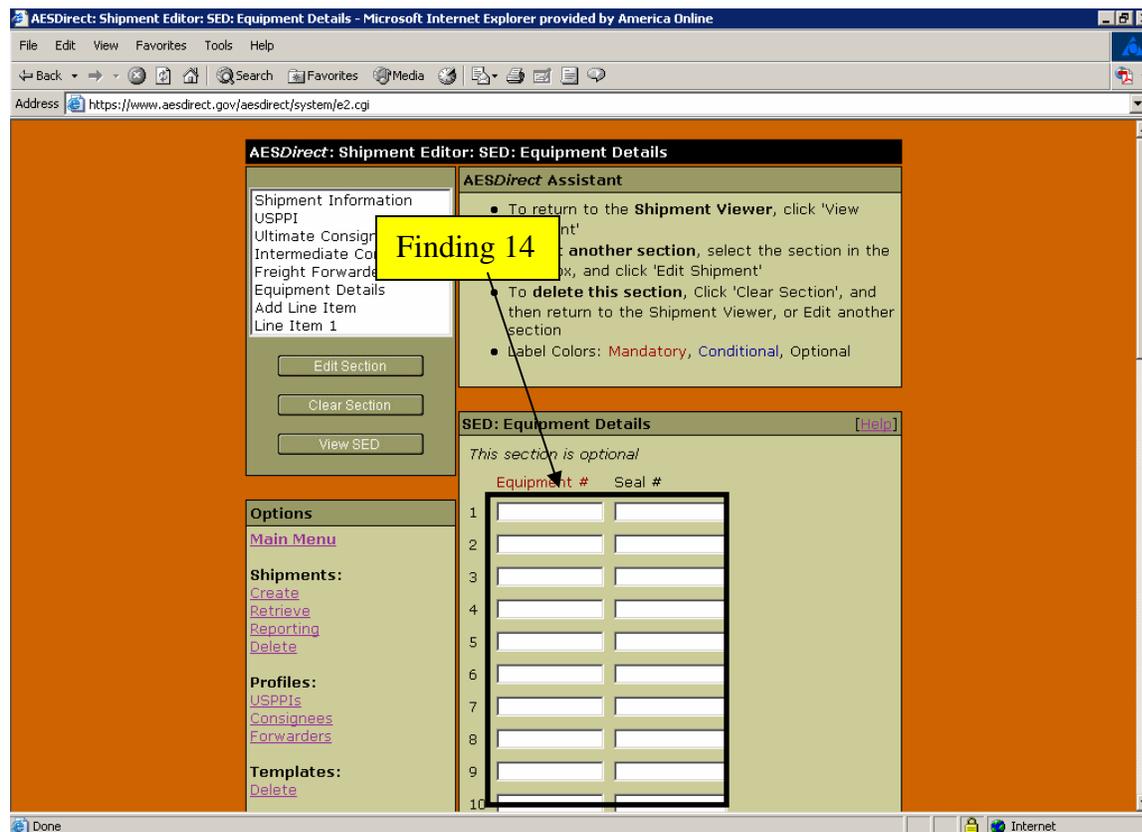


Figure 14. Accessibility findings: Data-entry fields are not labeled on the Equipment details screen.

**Finding 14:** There are no labels for the Equipment number and Seal number data-entry fields.

Priority: High

Although there are column headers that associate Equipment # and Seal # to the corresponding data-entry fields, the screen reader software does not make this association. The screen reader user only hears “edit edit”.

**Recommendation:** The screen reader user should hear either “Equipment Number” or “Seal Number” when tabbing through this screen, as per 1194.22 paragraph N of the Section 508 regulation. Label every data-entry field using the development software.

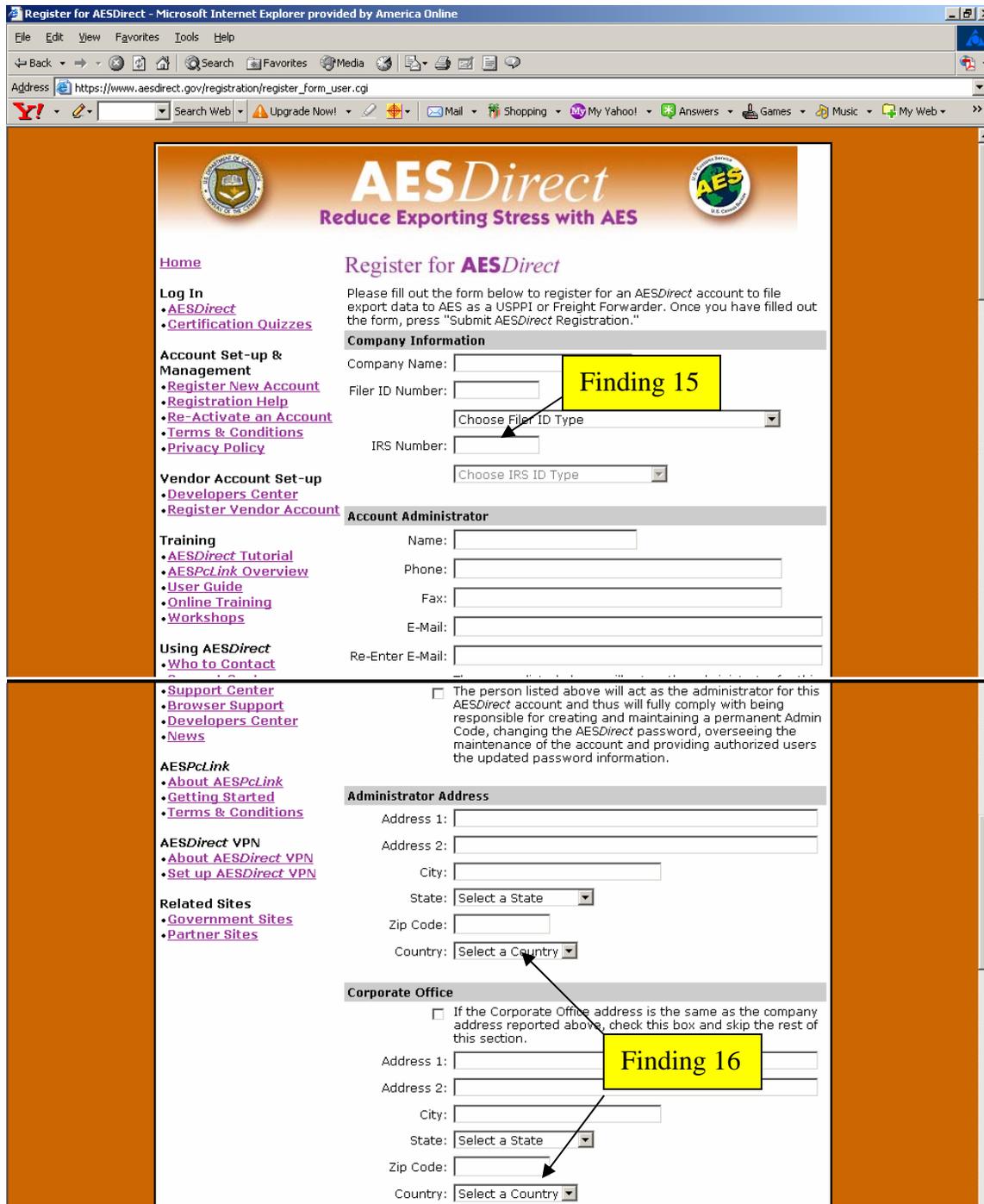


Figure 15. Accessibility findings: Top part of registration screen, showing one unavailable data-entry field and two instances of drop-down boxes containing one option.

**Finding 15:** The label for the IRS number data-entry field is detected by the screen reader software, but focus cannot be placed on the corresponding data-entry field.

Priority: Medium

A screen reader user may be puzzled why the IRS number label is present if no data can be entered in the corresponding data-entry field. This is not an accessibility violation because focus cannot be placed with a mouse either.

Recommendation: Either correct the programming to permit data entry into the IRS number field or eliminate it, along with the drop-down menu that follows. The changes can be accomplished with the development software.

**Finding 16: The “Country” drop-down boxes only have one entry.**

Priority: Low

This finding is not an accessibility violation. However, users may be puzzled why the “Country” drop-down boxes only have one option, United States of America.

Recommendation: If all registrants have United States addresses, there is no need for the two drop-down boxes. We recommend eliminating both of the “Country” drop-down boxes and storing the Country information with the registration data. The changes can be accomplished with the development software.

**Finding 17: Labels are not associated with their corresponding data-entry fields on the registration screen.**

Priority: High

Although labels are present on the registration page, there is a blank space the screen reader software detects when the arrow keys are used. This behavior violates 1194.22 paragraph N of the Section 508 regulation. The screen reader user expects to hear “<label> edit” when accessing a data-entry field, not “blank edit”.

Recommendation: Eliminate the blank space between the label and data-entry field. Use the development software to make this correction.

## II.7. Findings and Recommendations to Improve the Accessibility of the AESDirect Certification Quiz

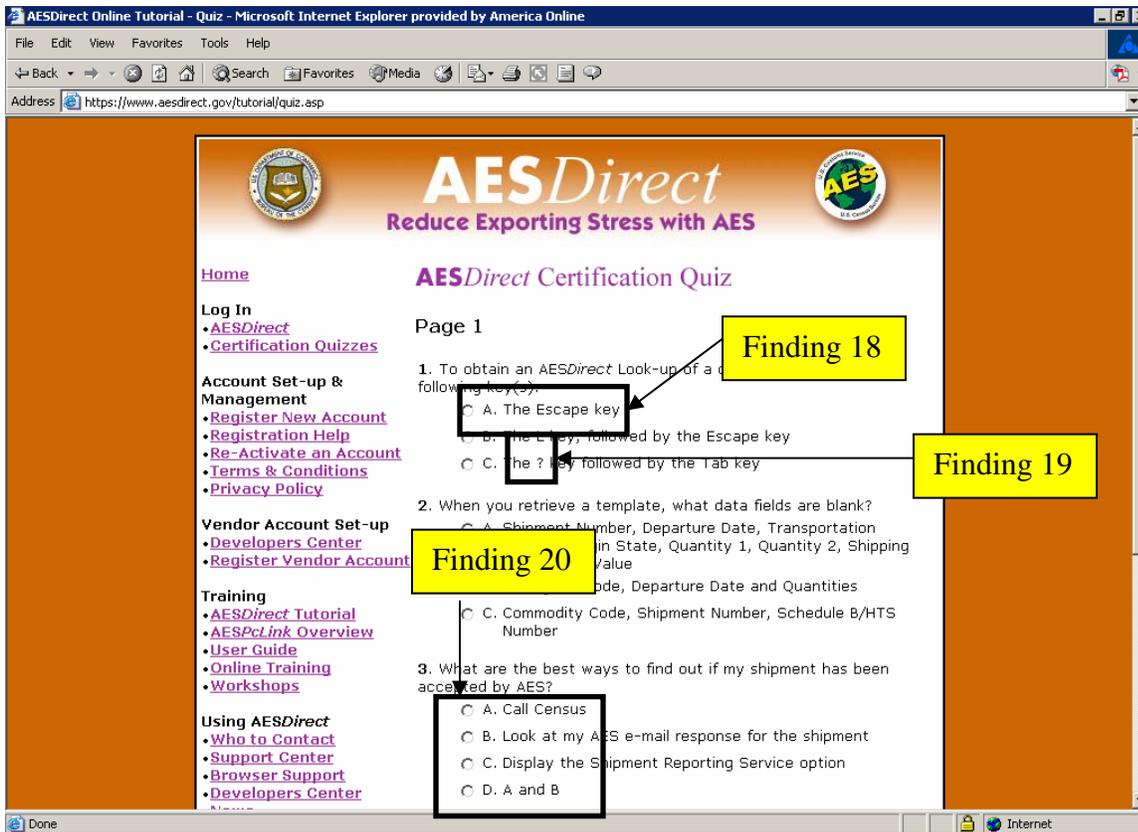


Figure 16. Accessibility findings: The AESDirect Certification Quiz, page 1 (top) does not give the opportunity for the screen reader user to hear the first question.

### **Finding 18:** Focus is put on the first response of question 1 on page 1.

Priority: High

Screen reader users do not have the same access to the question as persons who can see. The skipped question text violates 1194.22 paragraph N of the Section 508 regulation.

Recommendation: Place the cursor focus on question 1 when the page is loaded. The changes can be performed with the development software.

**Note:** This finding also applies to pages 2-4 of the Quiz.

### **Finding 19:** The “?” in response C of question 1 is inaccessible.

Priority: High

The question mark symbol in response C is an unlabeled graphic. Images must have text describing them as per 1194.22 paragraph A of the Section 508 regulation.

Recommendation: Replace the question mark graphic with a text question mark. Use the development software to make this correction.

**Finding 20: Assignment of capital letters to response options cause these options to be misread by the screen reader (Global)**

Priority: Medium

This is not a Section 508 violation. The capital “A” is interpreted by the screen reader to be part of the response text instead of an option because the period after the “A” is not vocalized by the screen reader.

Recommendation: Replace the capital letters with numbers before each option. Capital letters within options, for example “both A and B” or “A and C only”, should be replaced with numbers. Use the development software to make these corrections.

**Note:** This finding also applies to question 5 on page 2, question 5 on page 3, questions 1 and 4 on page 4, and questions 2 and 4 on page 5.

## II.8. Findings and Recommendations to Improve the Accessibility of the InstallShield Wizard for the AESDirect Tutorial

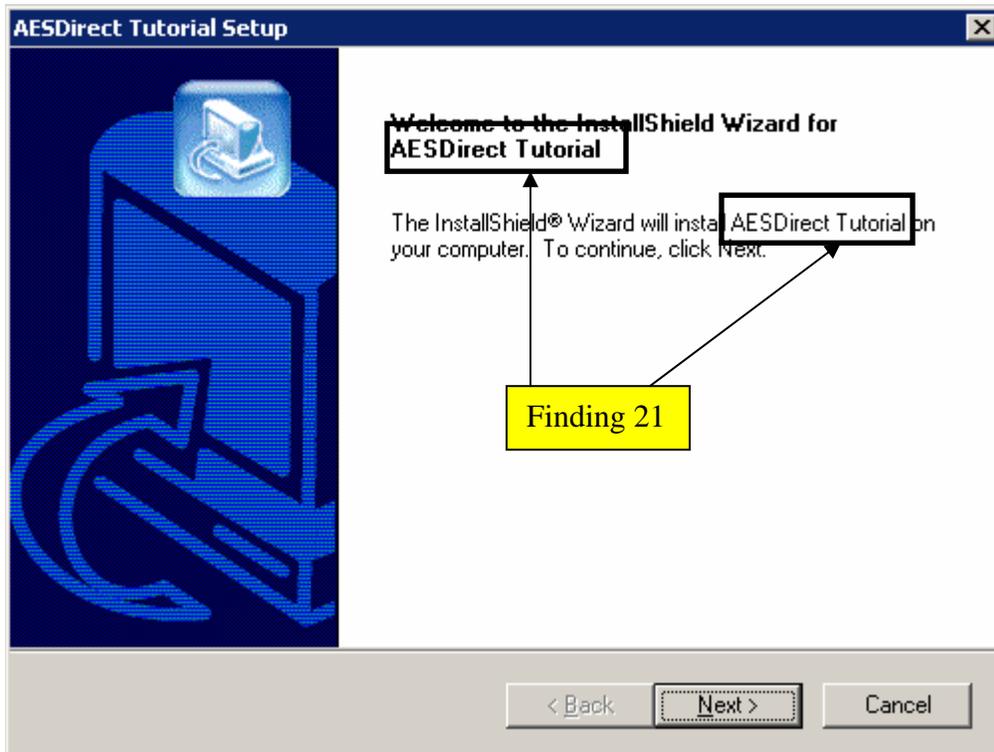


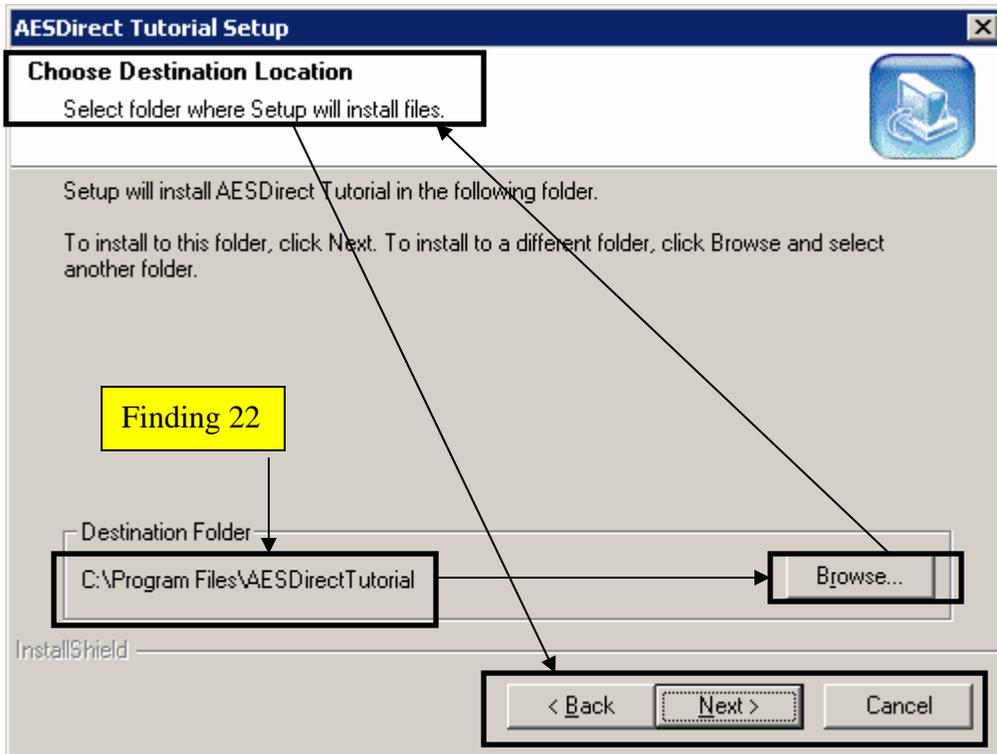
Figure 17. Accessibility findings: Screen reader users do not hear that the InstallShield Wizard installs the AESDirect Tutorial

### **Finding 21: The name of the tutorial is announced as a variable name**

Priority: High

The first installation screen does not provide the name of the application being installed. The application name is vocalized as “%P”, which is a variable name, in two locations. The instructions vocalized by the screen reader should not differ from the displayed text as per 1194.22 paragraph N of the Section 508 regulation.

Recommendation: The screen reader user should hear “A E S Direct Tutorial” when listening to this screen. Make this correction using the InstallShield development software.



**Figure 18. Accessibility findings: Screen reader users do not hear instructions in the proper order on the InstallShield Wizard Choose Destination Location screen**

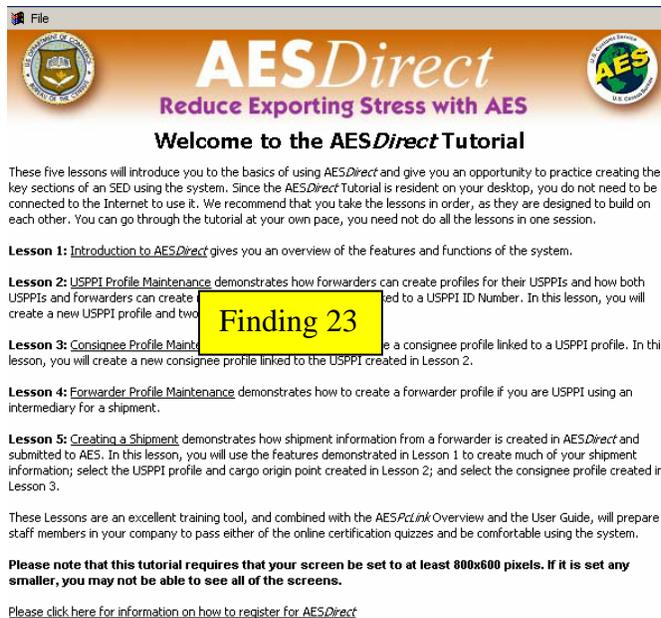
**Finding 22: The reading order for screen reader users differs from the natural reading order.**

**Priority:** High

The screen text is read out of order. As shown by the arrows in Figure 23, focus is first placed on the destination folder location, followed by the “Browse” button, the text in the white area, then the remaining buttons. The instructions vocalized by the screen reader should not differ from the displayed text as per 1194.22 paragraph N of the Section 508 regulation.

**Recommendation:** Correct the tab order so instructions are read before the button labels. Make this correction using the InstallShield development software

## II.9. Findings and Recommendations to Improve the Accessibility of the AESDirect Tutorial



**Figure 19. Accessibility findings: Screen reader users do not hear any content on the AESDirect Tutorial application starting screen.**

### **Finding 23: The AESDirect tutorial does not provide access to its content to keyboard users.**

**Priority:** High

Links for the lessons can only be accessed by clicking on them directly. The lessons and all remaining content can only be accessed by mouse clicks. No link text or plain text is detected by the screen reader. This application violates 1194.22 paragraphs A, B, and N of the Section 508 regulation.

**Recommendation:** Accessibility issues with the tutorial cannot be easily resolved using the current software because input focus is controlled by mouse clicks. The tutorial is based on a system with many usability problems (####see HCI memo #91###). Focus should be placed on creation of a usable and accessible AESDirect application. If time and resources permit, a new tutorial could be created with accessible software, which also has the benefit of not having to download and install the tutorial software. Remove the link to the tutorial in the AESDirect web site using the development software.

## II.10. Findings and Recommendations to Improve the Accessibility of the AESDirect User Guide

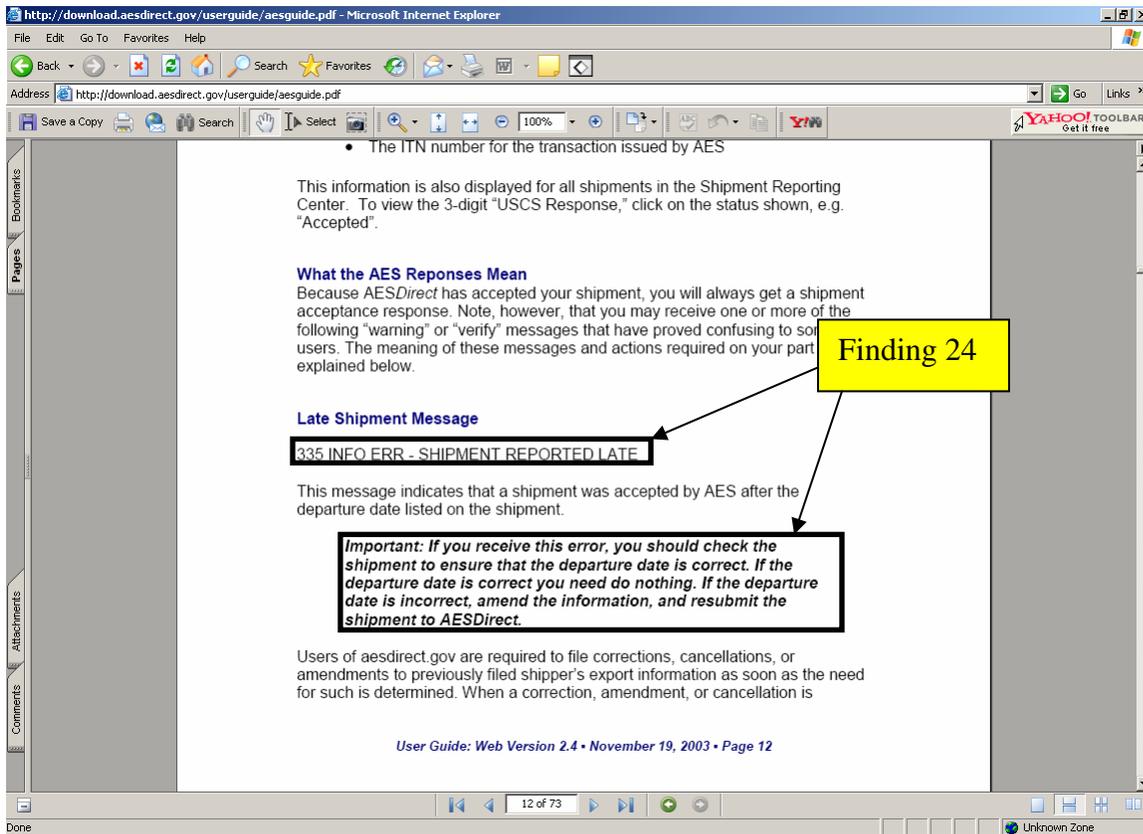


Figure 20. Accessibility findings: The full guide description is more informative than the error code message seen by users within the AESDirect application.

**Finding 24:** The Code 335 message AESDirect users see is not as informative as the full description provided in the AESDirect user guide.

Priority: Medium

This is not a Section 508 violation. However, the abbreviated words are difficult for screen reader users to understand

**Recommendation:** Instead of directing users to this guide for clarification, the full text description should be available to AESDirect users within the AESDirect application. Replace the abbreviated text messages within AESDirect with the full descriptions from this guide using the development software.

**Note:** This finding also applies to the messages on page 13 of the guide.

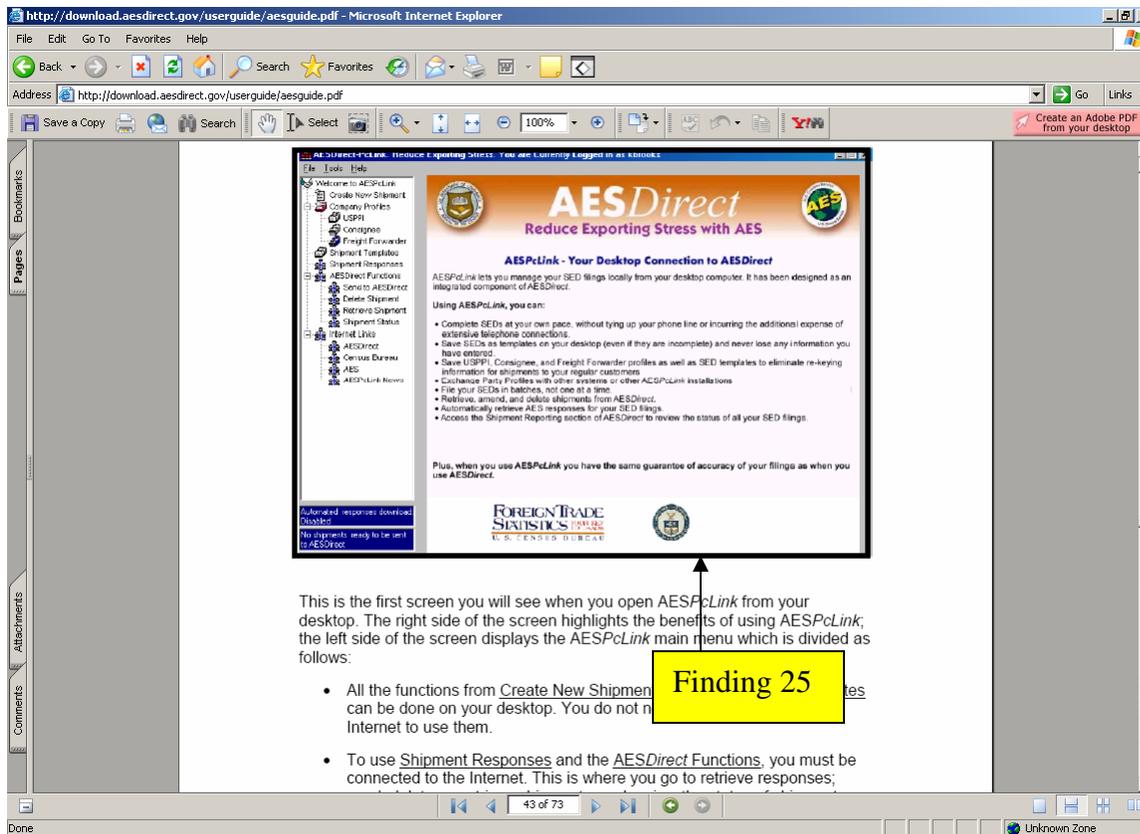


Figure 21. Accessibility findings: The screen shot on page 43 of the guide is inaccessible.

**Finding 25:** Alternate text is not provided for the screen shot on page 43 of the guide.  
**Priority:** High

Although the screen content is described below the image, an indication of the screen content is required per 1194.22 paragraph A of the Section 508 regulation.

**Recommendation:** We recommend a brief description, “AESPcLink welcome screen”, be entered as alternate text for the screen shot. Use Adobe Acrobat software to make this correction.

**Note:** This finding also applies to pages 44-60 of the guide. Unique alternate text will need to be tailored for each screen shot.

## II.11. Findings and Recommendations to Improve the Accessibility of the AESDirect Weblink

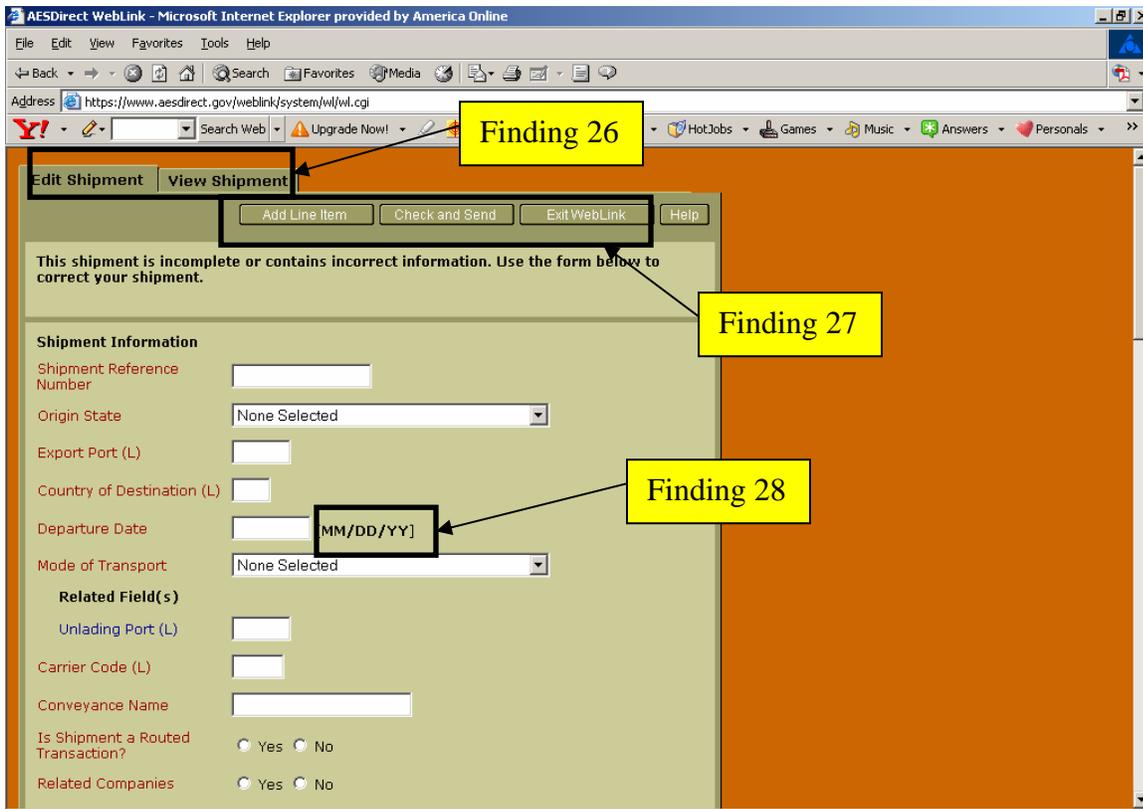


Figure 22. Accessibility findings: The top of the Weblink screen has inaccessible tabs and buttons.

**Finding 26:** The tabs, “View Shipment” and “Edit Shipment” are not labeled with the same text as displayed.

Priority: High

Both tabs are vocalized as “on mouseover link graphic” which describes the type of control but does not provide information as to its function. The screen text should not differ from the button title as per 1194.21 paragraph D of the Section 508 regulation.

Recommendation: The screen reader user should hear “View Shipment” and “Edit Shipment” when accessing these tabs. Label the appropriate tabs with “View Shipment” and “Edit Shipment” using the development software.

**Finding 27:** The buttons, “Add Line Item”, “Check and Send”, and “Exit Weblink” are not labeled with the same text as displayed.

Priority: High

All three buttons are vocalized as “on mouseover link graphic” which describes the type of control but does not provide information as to its function. The screen text should not differ from the button title as per 1194.21 paragraph D of the Section 508 regulation.

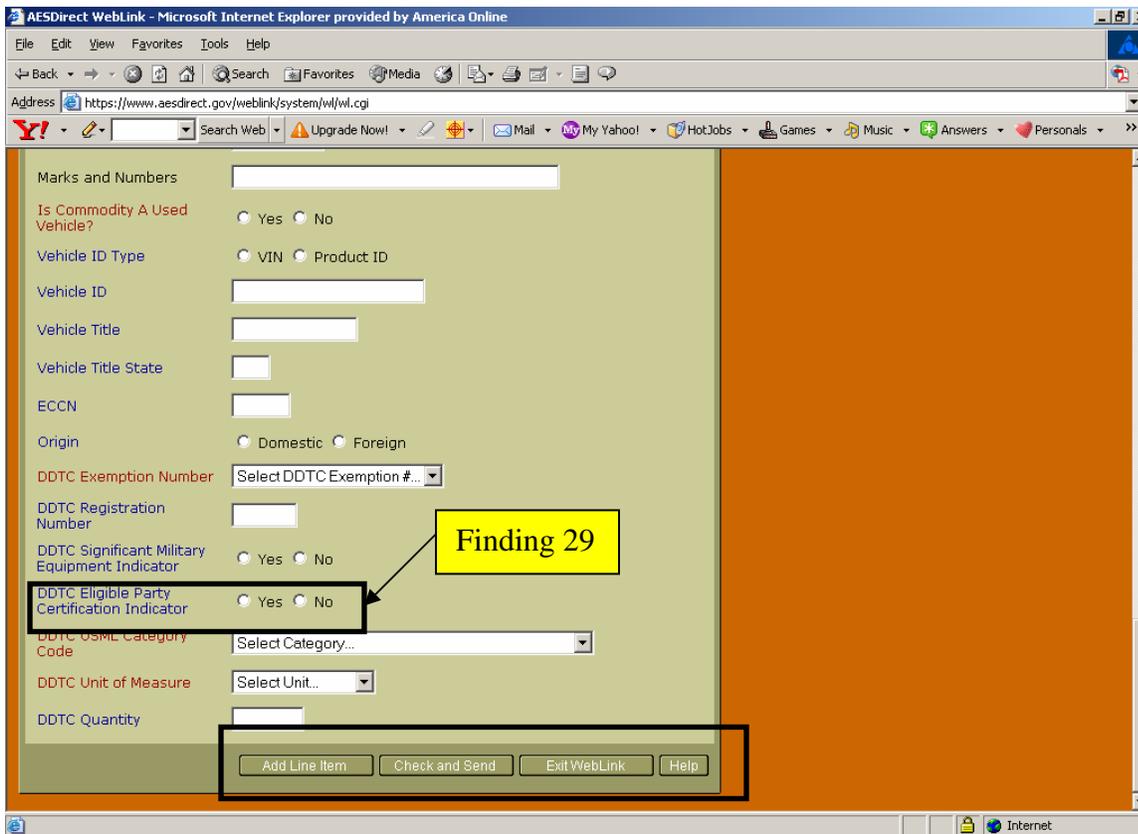
Recommendation: The screen reader user should hear “Add Line Item”, “Check and Send”, and “Exit WebLink” when accessing these buttons. Label the appropriate buttons with the text shown on screen using the development software.

**Finding 28: The instruction for the date format occurs after the data-entry field.**

Priority: Medium

This is not a Section 508 violation since the screen reader user has access to this instruction. However, the screen reader user does not have the benefit of this instruction prior to entering the date.

Recommendation: The screen reader user should have the benefit knowing the date format before entering the date. The instruction should immediately follow the label “Departure Date”. Modify the tab order so that the screen reader user hears the date format before the Departure Date data-entry field the using the development software.



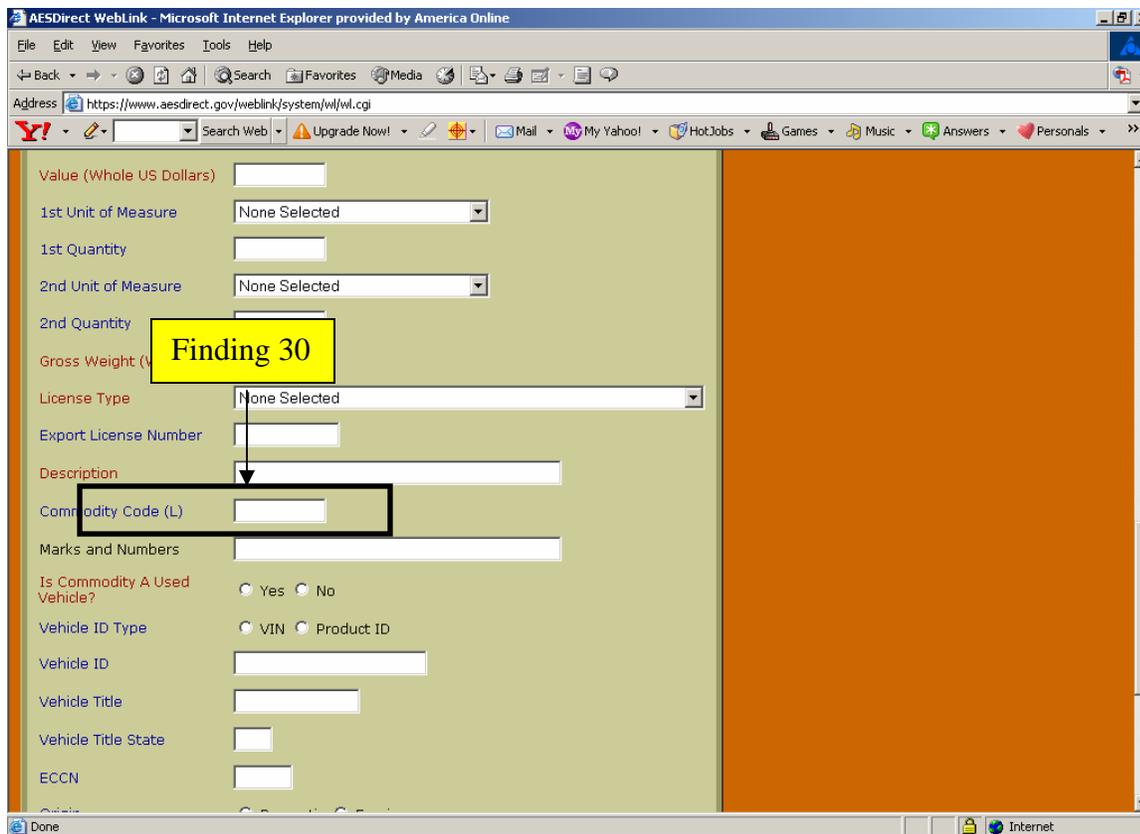
**Figure 23. Accessibility findings: The bottom of the WebLink screen has inaccessible buttons and a programming error in the radio button group.**

**Finding 29:** The number of radio button options detected by the screen reader software is incorrect.

Priority: High

There is a programming error in this radio button group. “Yes” and “No” options are both announced as “1 of 1” instead of “1 of 2” and “2 of 2”. This improper numbering violates 1194.22 paragraph N of the Section 508 regulation

**Recommendation:** The radio button group should have two items in the list, with “Yes” in the first position and “No” in the second position. Use the development software to make this correction



**Figure 24. Accessibility findings: The commodity code lookup window does not appear when a question mark (?) is entered in the data-entry field with the screen reader software running.**

**Finding 30: Screen reader users could not perform a commodity code lookup as indicated by the (L) following the data label.**

Priority: High

Although the commodity code lookup worked without screen reader software active, the lookup window failed to appear with screen reader software enabled. Screen reader users must have the same access to information as those who can see. This lack of access violates 1194.22 paragraph N of the Section 508 regulation

Recommendation: The commodity code lookup should function for screen reader users. Use the development software to make this correction

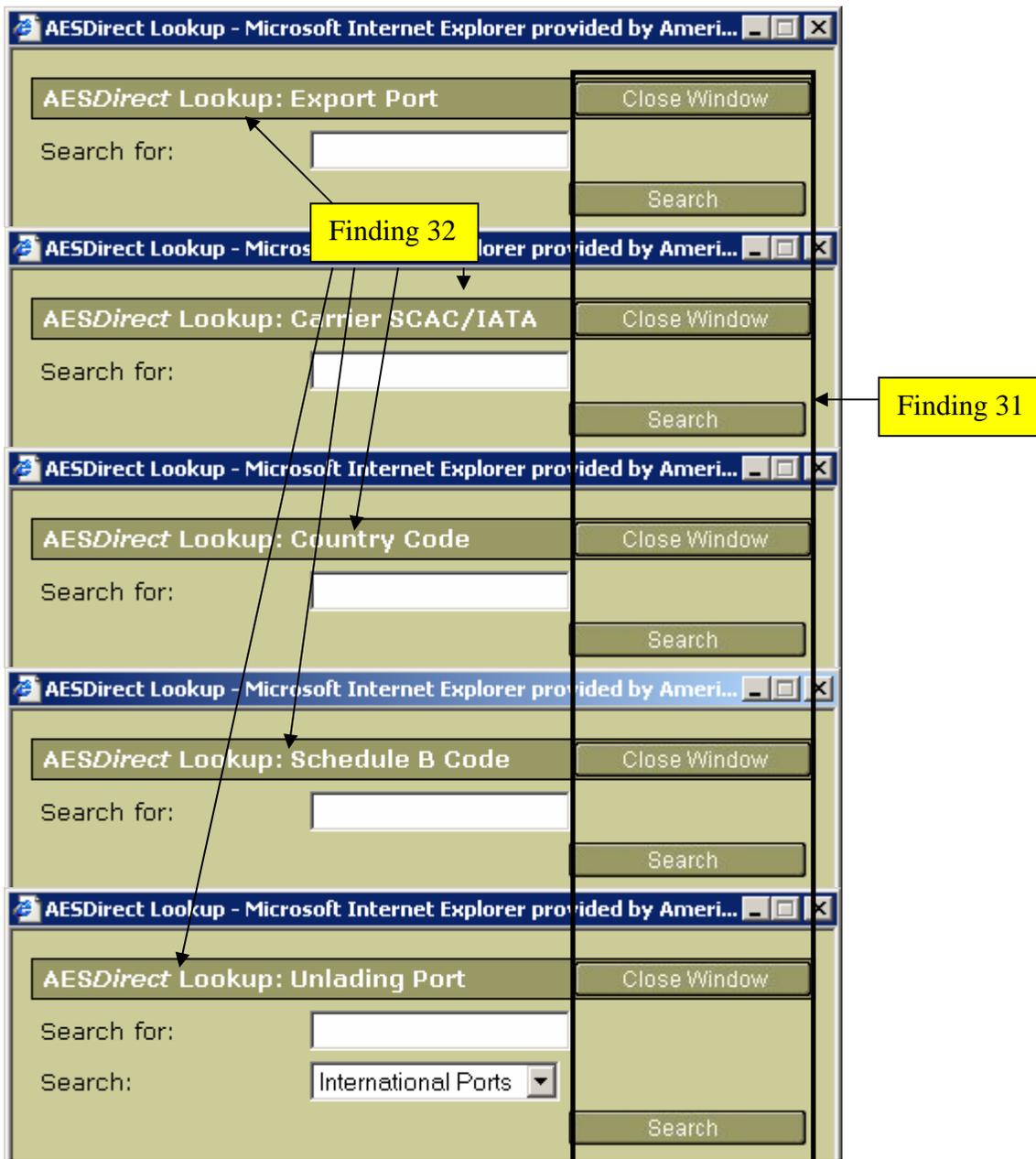


Figure 25. Accessibility findings: The AESDirect WebLink Lookup screens have inaccessible text and buttons.

**Finding 31:** The buttons, “Close Window”, and “Search” are not labeled with the same text as displayed.

Priority: High

The “Close Window” button is vocalized by the screen reader as “visited link” and the “Search” button is vocalized as “Zero button”. The screen text should not differ from the button title as per 1194.21 paragraph D of the Section 508 regulation.

Recommendation: The screen reader user should hear “Close Window” and “Search“ when accessing these buttons. Label the appropriate buttons with the text shown on screen using the development software.

**Finding 32**: The AESDirect Look-up text describing the search objective is not accessible.  
Priority: High

The AESDirect text describing the object of the search, whether it be “Export Port”, “Carrier SCAC/IATA”, “Country Code”, “Schedule B Code”, or “Unlading Port” is not detected by the screen reader software. Although this text appears to be readable, the screen reader interprets it as an image. Images must have text describing them as per 1194.22 paragraph A of the Section 508 regulation.

Recommendation: Images have an alt attribute by which text can be entered to describe the image. Alt text should be assigned to each of the images. The text viewable by sighted users should precede in tab order the “Close Window” button on each corresponding look-up window. This change can be accomplished using the development software.

## II.12. Findings and Recommendations to Improve the Accessibility of the AESPcLink

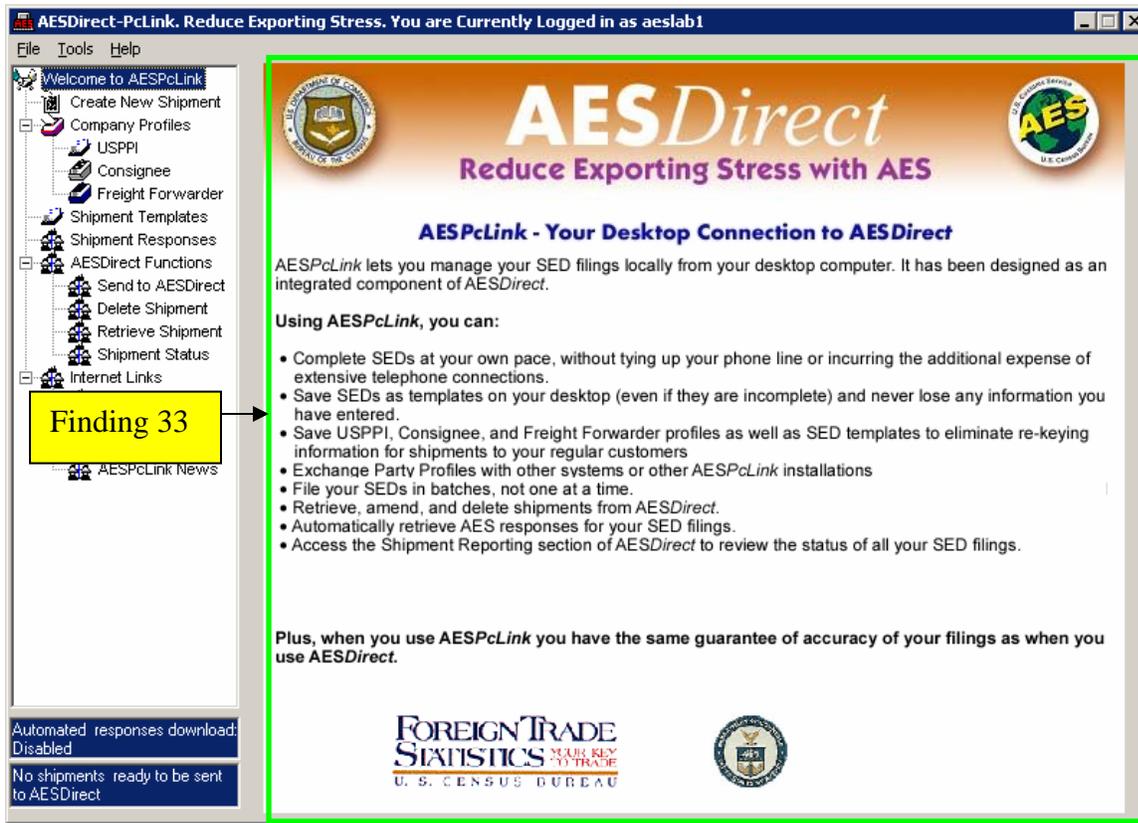


Figure 26. Accessibility findings: Welcome screen instructions are not accessible.

### **Finding 33: Instruction text is not detected by the screen reader software.**

Priority: High

The welcome screen is an image pasted into a template used to develop AESPcLink. Instructions are not vocalized by the screen reader. A screen reader user may not know how to proceed. This behavior violates 1194.22 paragraph N of the Section 508 regulation.

**Recommendation:** Although screen reader users may navigate through the application, they are not provided the same access to the welcome screen information as users who can see. This information must be accessible. The welcome screen content should be created as plain text and inserted into the area the welcome screen image currently occupies. Use the development software to make this correction.

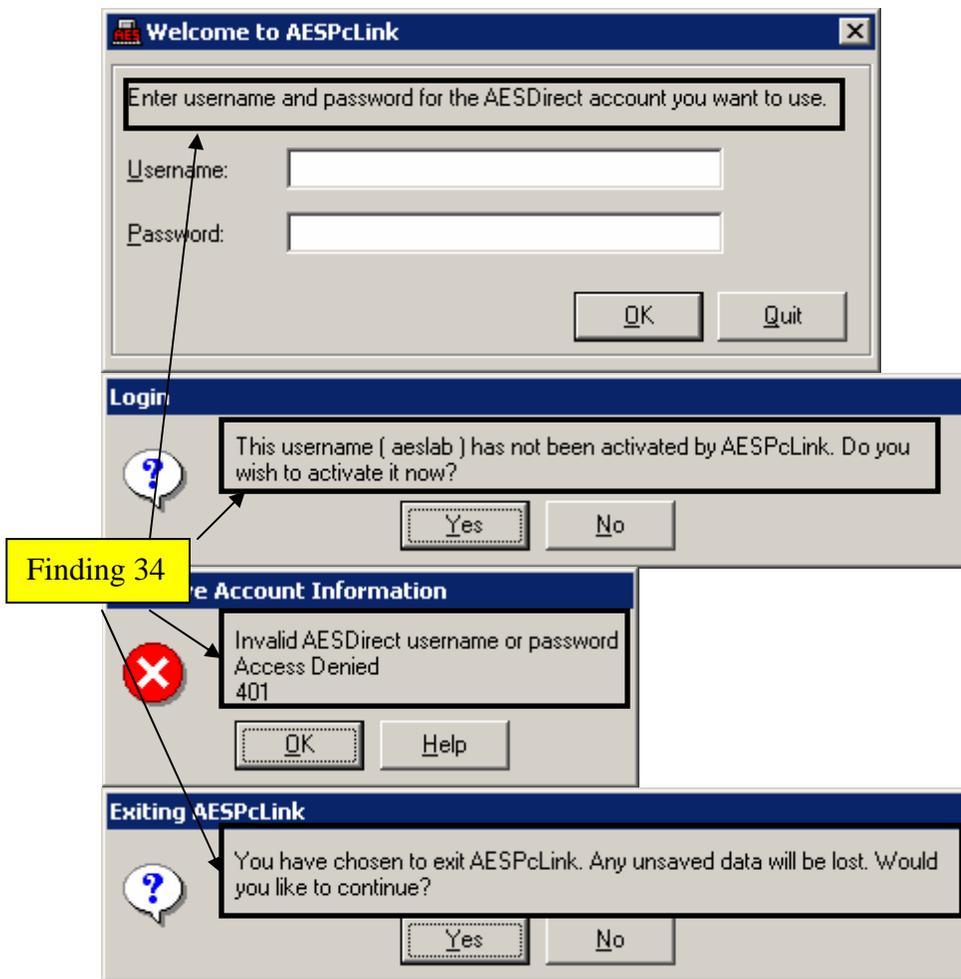


Figure 27. Accessibility findings: Instructions on four pop-up screens are not accessible.

**Finding 34: Instruction text is not detected by the screen reader software.**

Priority: High

Instructions are not vocalized by the screen reader. A screen reader user may not know how to proceed. This behavior violates 1194.22 paragraph N of the Section 508 regulation.

Recommendation: Instructions must be heard before focus is placed on the data-entry fields.

Instruction text could be placed on a button with no border preceding, in tab order, the first button or data-entry field.

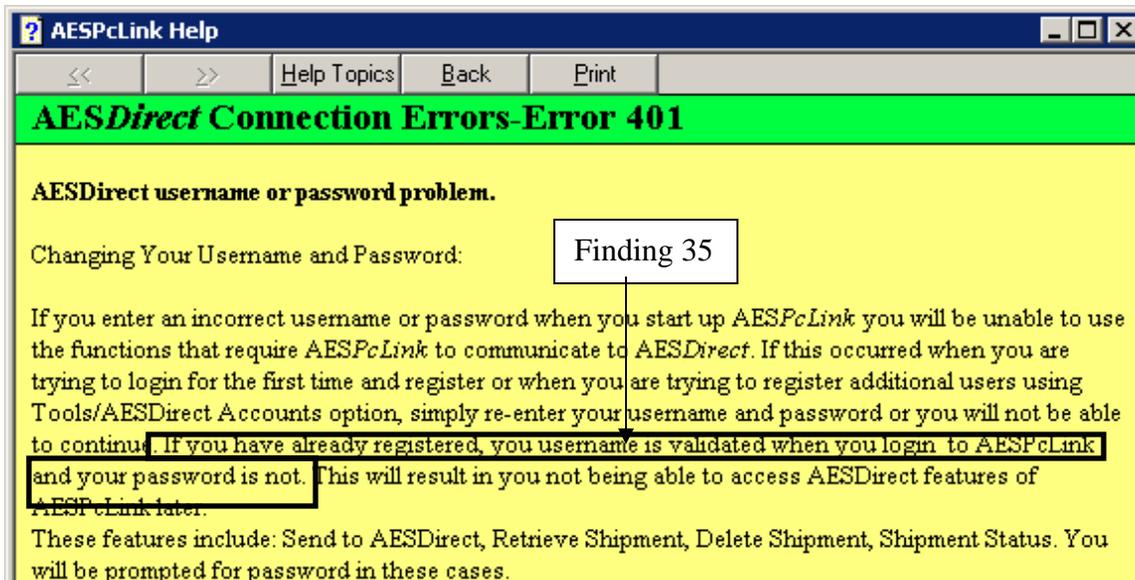
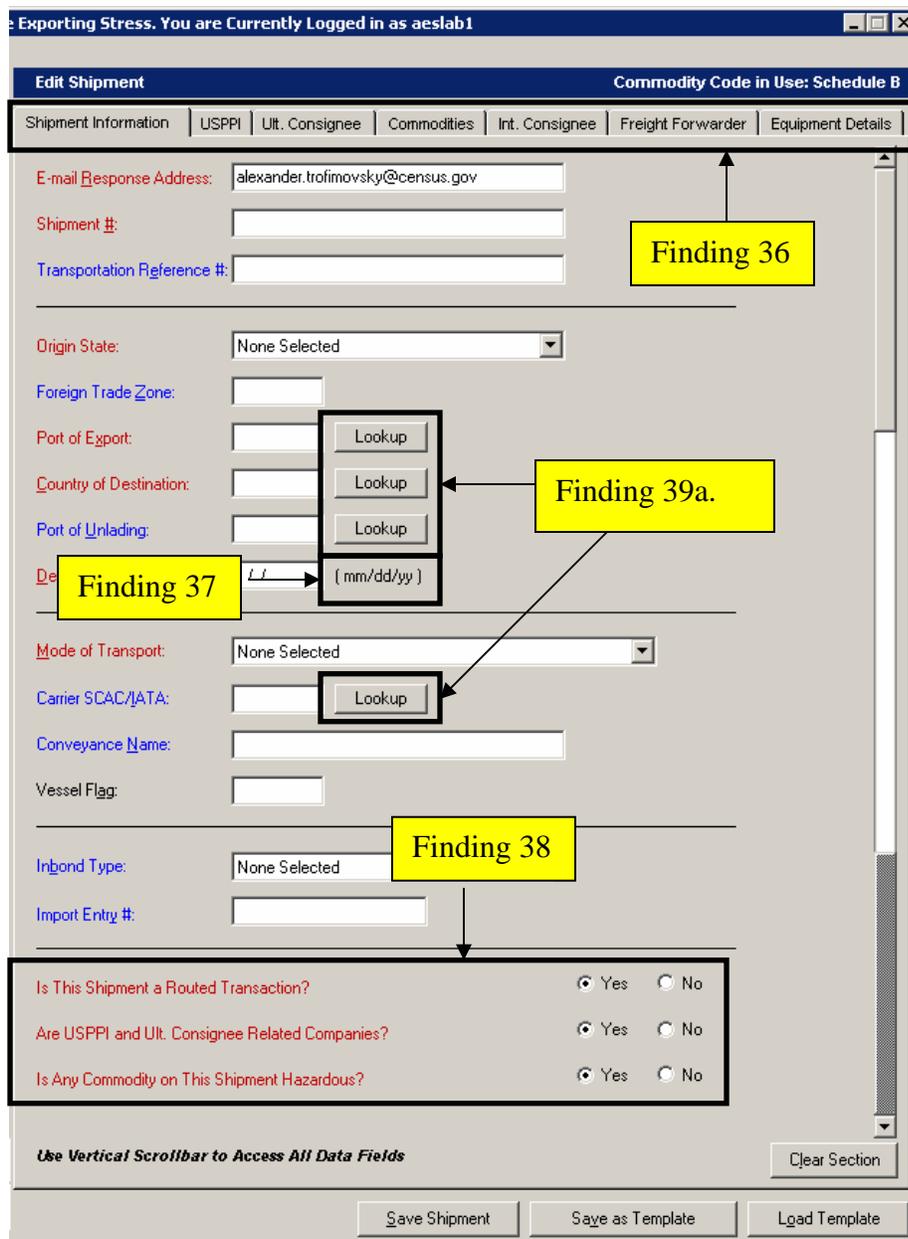


Figure 28. Accessibility findings: A sentence within the password problem help screen is grammatically incorrect.

**Finding 35:** The sentence highlighted in Figure 37 is incomplete and does not make sense.  
Priority: Medium

This is not a Section 508 violation. Instructions seem to be missing. Several sentences may need to be included for all the login steps.

Recommendation: We recommend a Subject Matter Expert review the login steps and create new text for this window. After the instruction text is drafted, use the development software to make this correction.



**Figure 29. Accessibility findings: The Shipment information data-entry screen has four accessibility findings, see below.**

**Finding 36: Folder tab labels are not accessible.**

**Priority: High**

The screen reader software detects the presence of the tabs and announces how to navigate between them, but it does not vocalize the tab label. This behavior violates 1194.21 paragraph D of the Section 508 regulation.

**Recommendation:** Tab labels must be detected by the screen reader software in order for users who cannot see to be able to accomplish their data-entry tasks. Screen reader users find it

difficult to understand abbreviations. Spell out “Ultimate” for “Ult.” And “Intermediate” for “Int.” for the appropriate tabs. Use the development software to make this correction.

**Finding 37: Instruction text for the date format is not detected by the screen reader software.**

Priority: High

Instructions for the expected date format are not vocalized by the screen reader. This behavior violates 1194.22 paragraph N of the Section 508 regulation.

Recommendation: Instructions must be accessible and heard before focus is placed on the data-entry field. The instruction text for the date format should be moved before the data entry field. Alternately, the instruction could remain in its current position and placed on a button with no border preceding, in tab order, the data-entry field. Use the development software to make this correction.

**Finding 38: Question text is not detected by the screen reader software.**

Priority: High

Questions are not vocalized by the screen reader. This behavior violates 1194.22 paragraph N of the Section 508 regulation.

Recommendation: Instructions must be heard before focus is placed on the radio buttons. Text for each question could be placed on a button with no border preceding, in tab order, the first radio button response. Alternately, the question text could be implemented as a statement with a check box, replacing the yes/no radio buttons. Use the development software to make these corrections.

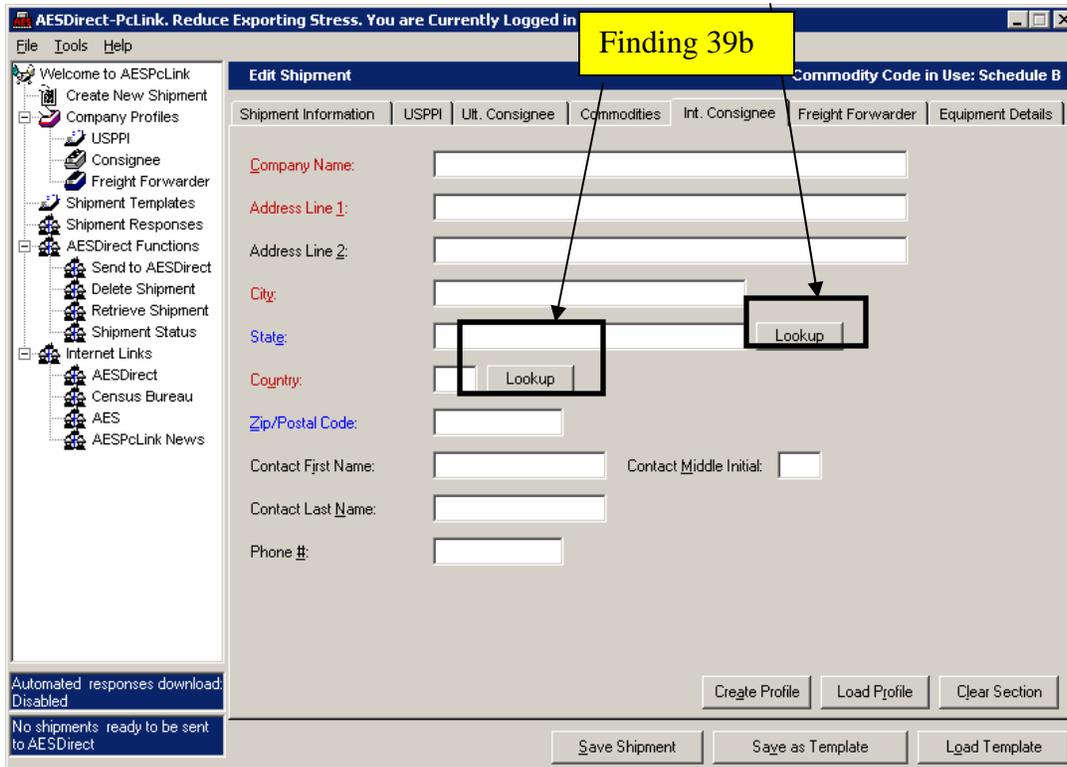


Figure 30. Accessibility findings: Lookup function is inaccessible. (Here on the Ultimate and Intermediate Consignee screens)

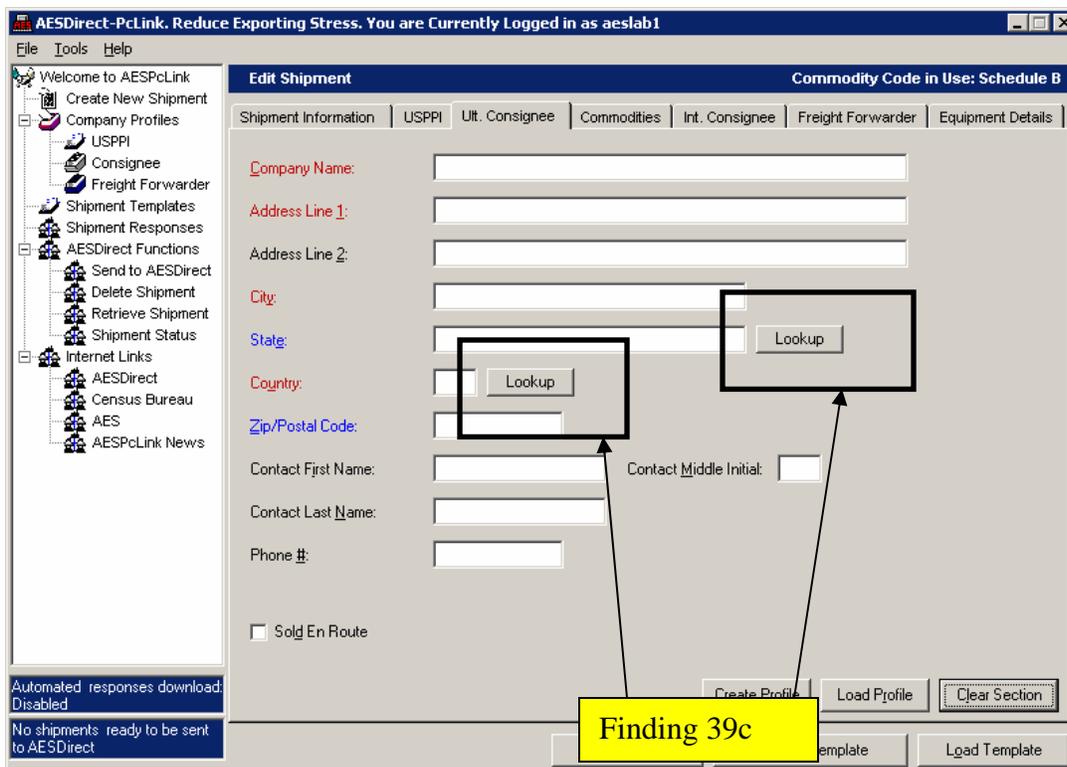


Figure 31. Accessibility findings: Another example where the lookup function is inaccessible.

**Finding 39a-c: The lookup function generates inaccessible results.**

Priority: High

When a screen reader user returns to the data-entry screen after conducting a lookup, labels display the complete text. However, the screen reader only vocalizes the last five or six characters. This behavior violates 1194.22 paragraph N of the Section 508 regulation.

Recommendation: Label text must be available to screen reader users. Use the development software to make this correction.

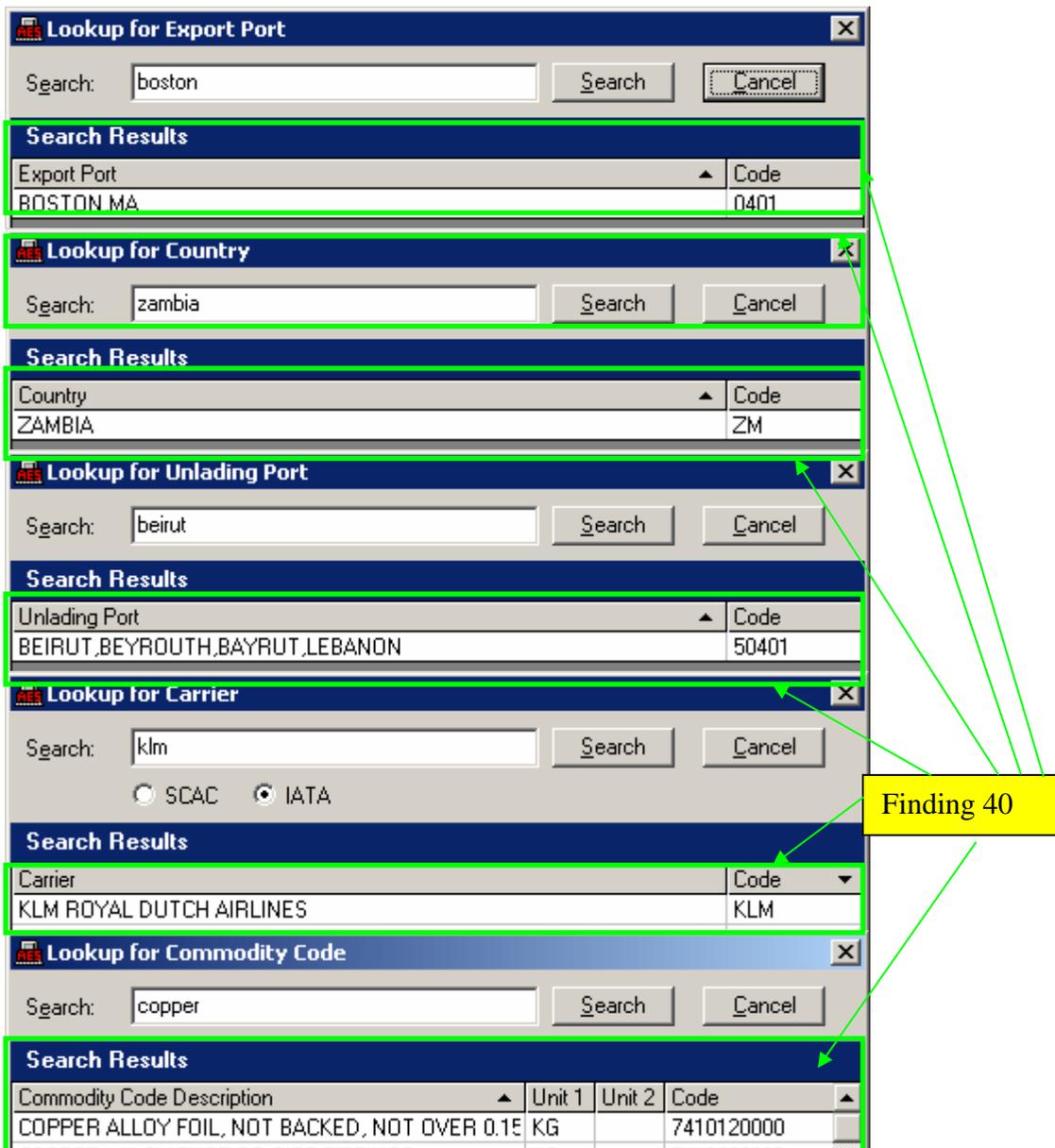


Figure 32. Accessibility findings: All lookup screens generated inaccessible data tables.

**Finding 40: Column headers are not associated with data values in the search results table.**  
 Priority: High

For data in a table to be accessible to screen reader users, the column header must be associated with each value. Table data is also inaccessible. This behavior violates 1194.22 paragraph G of the Section 508 regulation.

Recommendation: Associate the header “Code” with the letter or number code below. Associate “Export port”, “Unlading port”, “Carrier”, “Commodity Code Description”,

“Country”, and “State” with the corresponding text table entry. Use the development software to make this change. Refer to <http://www.jimthatcher.com/webcourse9.htm> for help.

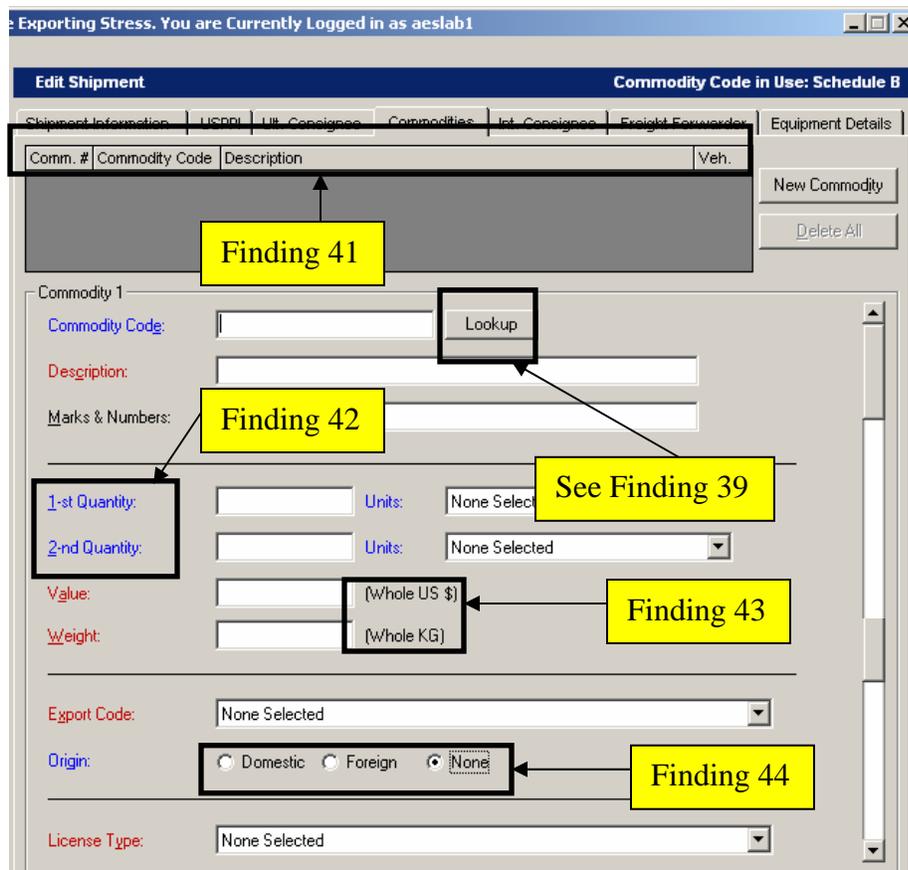


Figure 33. Accessibility findings: The Commodity screen has five accessibility findings.

**Finding 41: Column headers for commodity items are not accessible.**

Priority: High

For data in a table to be accessible to screen reader users, the column header must be associated with each value. Lack of such an association violates 1194.22 paragraph G of the Section 508 regulation.

**Recommendation:** The commodity item column headers must be accessible and be associated with any table data values. Screen reader users find abbreviations difficult to understand, so “veh.” should be spelled out as “vehicle” and “Comm. #”, should be spelled out as “commodity number”. There is adequate space to accomplish this correction on the form. Use the development software to make these changes. Refer to <http://www.jimthatcher.com/webcourse9.htm> for help.

**Finding 42: The screen reader mispronounced two labels for data-entry fields.**

Priority: Low

This is not a Section 508 violation. However, screen reader users may find these two labels difficult to understand because of the hyphenated characters.

Recommendation: We recommend replacing “1-st Quantity” with “First Quantity” and “2-nd Quantity” with “Second Quantity”. There is sufficient room on the form to make this correction. Use the development software to make these changes.

**Finding 43: Instruction text for the dollar format is not detected by the screen reader software.**

Priority: High

Instructions for the expected dollar format are not vocalized by the screen reader. This behavior violates 1194.22 paragraph N of the Section 508 regulation.

Recommendation: Instructions must be accessible and heard before focus is placed on the data-entry field. The instruction text for the dollar format should be moved before the data-entry field. Alternately, the instruction could remain in its current position and placed on a button with no border preceding, in tab order, the data-entry field. Use the development software to make this correction.

**Finding 44: The “origin” radio button group is not programmed correctly.**

Priority: High

Testing revealed the radio button options (domestic, foreign, none) are vocalized as 1 of 2, 2 of 2, and 1 of 1. The screen reader user expects to hear 1 of 3, 2 of 3, and 3 of 3 for the options. This behavior violates 1194.21 paragraph L of the Section 508 regulation.

Recommendation: We recommend the “none” option be added to the “origin” radio button group. Use the development software to make this correction.

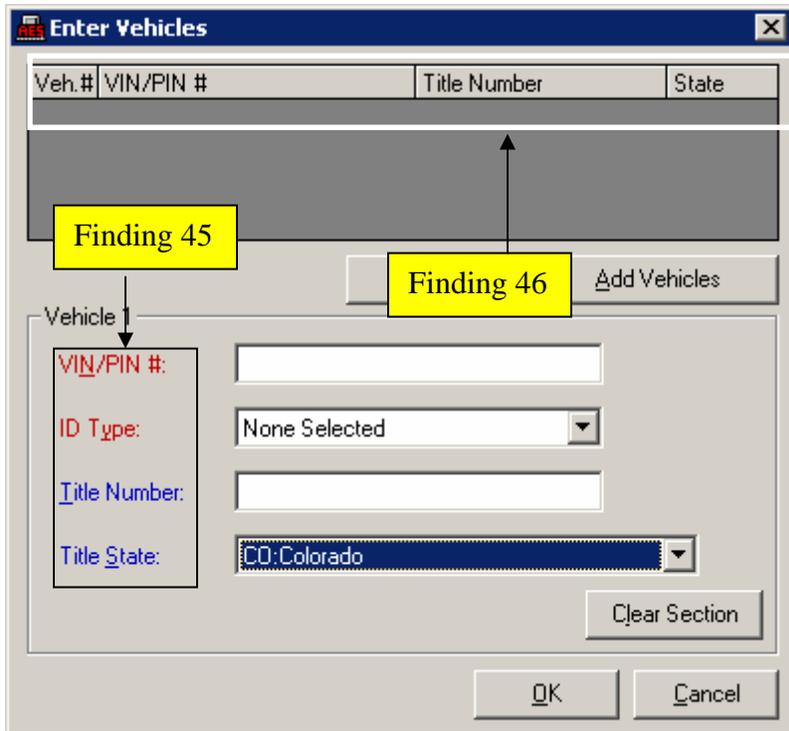


Figure 34. Accessibility findings: Column headers and data-entry labels are inaccessible.

**Finding 45: Column headers for vehicle items are not accessible.**

Priority: High

For data in a table to be accessible to screen reader users, the column header must be associated with each value. Lack of such an association violates 1194.22 paragraph G of the Section 508 regulation.

Recommendation: To be accessible, the commodity item column headers must be associated with any table data values. The screen reader pronounces “#” as “pound”, so, where space permits, replace “#” with “number”. Use the development software to make these changes.

**Finding 46: Data-entry labels are not detected by the screen reader software.**

Priority: High

Data-entry labels for four fields are not vocalized by the screen reader. Failure to read labels violates 1194.22 paragraph N of the Section 508 regulation.

Recommendation: Accessible labels must be provided so screen reader users can have the equivalent access to the data-entry fields as users who can see. Use the development software to make this correction.

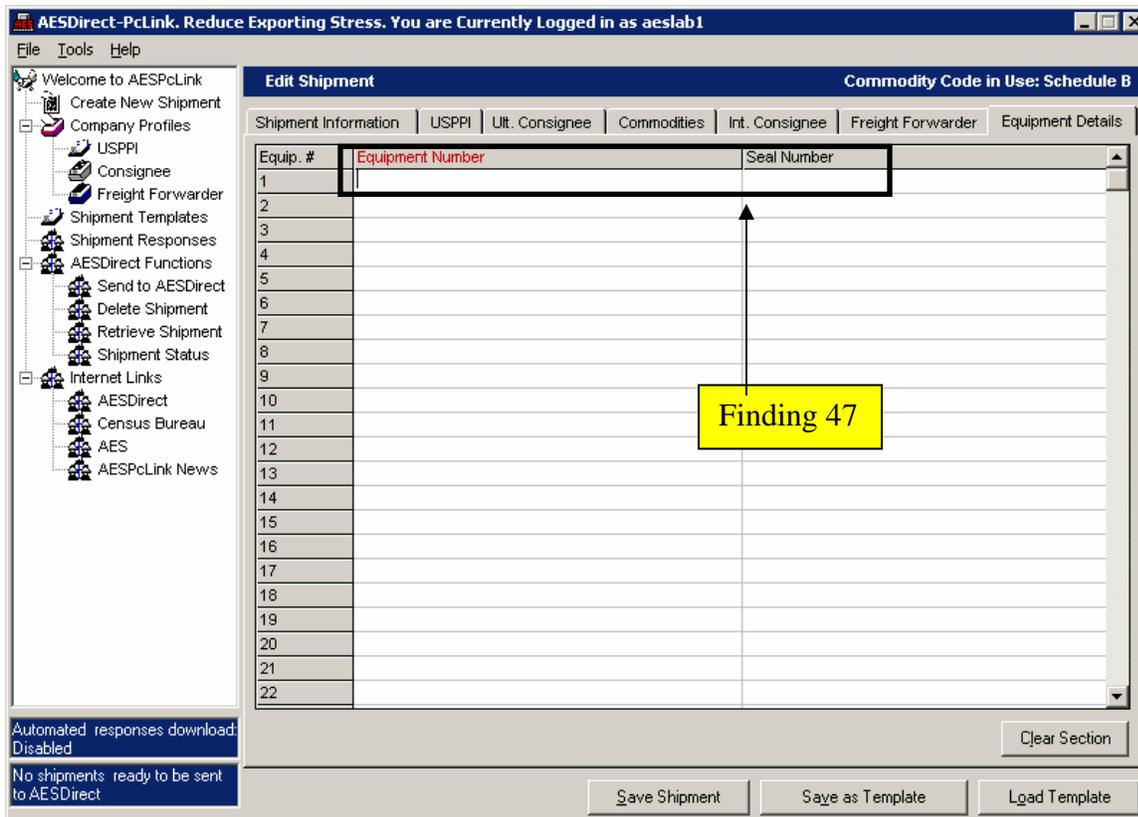


Figure 35. Accessibility findings: Data-entry fields on the Equipment Details screen are not labeled.

**Finding 47: There are no labels for the Equipment number and Seal number data-entry fields.**

Priority: High

Although there are column headers that associate Equipment # and Seal # to the corresponding data-entry fields, the screen reader software does not make this association. The screen reader user only hears “edit edit”.

Recommendation: The screen reader user should hear both “Equipment Number” and “Seal Number” when tabbing through this screen, as per 1194.22 paragraph N of the Section 508 regulation. Label every data-entry field using the development software

## **II.13. Summary to Accessibility Study of AES*Direct* products**

AES*Direct* and its supporting software packages have numerous accessibility issues. Navigational skip links, used to bypass site navigation links are not used. Some text headers are created as graphics instead of plain text. Colored text, which cannot be distinguished by low vision and color blind users and persons who cannot see, is used to identify completion status. The AES*Direct* tutorial needed to be downloaded and installed to be used which is impossible for users who cannot see because the installer is inaccessible. Once installed, testing revealed the tutorial text is inaccessible and keyboard commands did not function. Screen shots within the AES*Direct* user guide do not provide alternate text describing the contents on the screen. AESPCLink lookup screen search results are displayed in inaccessible tables.

During the process of accessibility testing, some usability problems were detected. All links are purple, even when visited. Links should change color, from blue to magenta (purple). Graphical bullets are used instead of text bullets, which made traversing the screen take longer than necessary and did not add value. Graphical links appearing as buttons are vocalized as variable names instead of the link text. Since the “AES” part of the words AES*Direct* and AESPCLink sounds like “aze”, we recommend putting spaces between the letters, e.g. “A E S Direct” for proper pronunciation.

There are some spelling errors which cause the screen reader to mispronounce words. Abbreviated words are hard to understand when vocalized by the screen reader. Two screens within the AESPCLink application required the user to scroll down to enter data. If the user does not see the instruction to scroll down, he or she may miss entering some data. After searching for a code on a lookup screen within AESPCLink and returning to an edit shipment screen, the screen reader can only detect the last word in a multi-word label for data-entry fields.

Accessibility issues with the tutorial cannot be easily resolved using the current software because input focus is controlled by mouse clicks. If time and resources permit, a new tutorial could be created in accessible HTML, which also has the benefit for the user not having to download and install the tutorial software. If accessibility recommendations are followed for AES*Direct*, AESPCLink, the AES*Direct* user guide, and the Certification Quiz, shipment export declaration could be carried out efficiently and quickly and with greater satisfaction by all system users.

## **Appendix A – Usability Goals**

### Overall Goals

#### Novice/Expert Participants

As this was an evaluative usability study with the goal of getting baseline measures, we did not set accuracy, efficiency, or satisfaction goals. After participants performed the tasks and we got the measure in the three areas, we listed the results as the baseline usability score. As you begin to make changes to the interface and continue to take usability measures you can gauge the changes to the site by whether user performance goes up from the baseline scores.

## **Appendix B – Usability Announcement Posted on Craig’s List for Novices**

### **\$40 for Participating in Census Bureau Usability Evaluation<sup>8</sup>**

The U.S. Census Bureau is seeking participants for a usability evaluation of one of our Web sites. By volunteering for the study you can provide a valuable service to your government as well as to your fellow citizens who use the Web site.

We need people with the following qualifications:

- Used the Internet for at least a year.
- Uses the Internet at least twice a week.
- Familiar with looking for information and/or filling out forms on the Internet.
- Have mailed something overseas or could see yourself mailing something overseas.

The test session will last 60 to 90 minutes, and can be scheduled to take place at a time convenient for you between July 31 and August 18, 2006. The testing is conducted at the Census Bureau headquarters in Suitland, MD, right off the Green Line Metro. (Free visitor parking is also available.) Each test participant receives an honorarium of \$40.00 as compensation for his/her expenses.

If you would like more information, contact Alexander Trofimovsky at 301-763-4971 or [alexander.trofimovsky@census.gov](mailto:alexander.trofimovsky@census.gov).

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<sup>8</sup> Experts were harder to recruit and were offered \$65.00 for their assistance.

## Appendix C – Usability Recruiting Questions for Novices Only

<b>Question:</b>	<b>Answer:</b>	<b>Requirement for Novice Participant</b>
1) How often do you use the internet?		At least twice a week
2) How long have you used the internet?		At least a year
3) Have you ever mailed something overseas, or could you see yourself doing this at some point in the future?		Yes
4) Have you ever filled out a form on the Internet or have you searched for information on the Internet?		Yes

**Appendix D – Usability Consent Form**

The Census Bureau routinely tests products used for collecting data or disseminating data in order to produce the best products possible.

You have volunteered to take part in a study to improve a product used for disseminating Census Bureau data. In order to have a complete record of your comments, your interview session will be audio-taped/video-taped. We plan to use the tapes to improve the product. Staff involved in this product design research will have access to the tapes. The tapes may also be used for training others to conduct this type of research and in presentations to professional audiences.

I have volunteered to participate in this Census Bureau product design study, and I give permission for my tapes to be used for the purposes stated above.

---

Participant’s Signature

---

Printed Name

---

Date

## Appendix E – Usability Questionnaire on Computer Use and Internet Experience

**1. What computer applications do you use?**

*Mark (X) all that apply*

- e-mail
- Internet
- Word processing (MS-Word, WordPerfect, etc.)
- Spreadsheets (*Excel, Lotus, Quattro, etc.*)
- Databases (MS-Access, etc.)
- Accounting or tax software
- Engineering, scientific or statistical software
- Other applications, please specify \_\_\_\_\_

**2. How *comfortable* are you in learning software applications that are new to you?**

*Circle one number for each*

Not at all Comfortable					Very Comfortable
1	2	3	4	5	

**3. Computer windows can minimized, resized, and scrolled through. How *comfortable* are you in manipulating a window?**

1	2	3	4	5
---	---	---	---	---

**4. How *comfortable* are you using and navigating through the Internet?**

1	2	3	4	5
---	---	---	---	---

**5. How *often* do you work with any type of data through a computer?**

Never					Very Often
1	2	3	4	5	

**6. How *often* do you perform complex analyses of data through a computer?**

1	2	3	4	5
---	---	---	---	---

**7. How *often* do you use the Internet to find data?**

1	2	3	4	5
---	---	---	---	---

**8. How *often* do you use websites or printed reports to get data?**

1	2	3	4	5
---	---	---	---	---

**9. How often do you use foreign trade data?**

Not at all  
familiar

Very  
familiar

**10. How familiar are you with foreign trade (terms, data, etc)?**

1      2      3      4      5

**11 (novices<sup>9</sup>). How familiar are you with the Foreign Trade Division (terms, data, etc.)**

1      2      3      4      5

**12 (novices). How familiar are you with Census Bureau terminology?**

1      2      3      4      5

**11 (experts). Have you ever had problems with AESDirect?  
Please explain:**

**12 (experts). Are you the only one who files with AESDirect  
from your company or are there other people who also file?**

**13 (experts). How long have you used AESDirect?**

---

<sup>9</sup> Questions 1 – 10 were asked of everyone. However, a few questions were asked of only the novice or expert group.

## **Appendix F – Usability General Introduction**

### **Script for AESDirect**

Thank you for your time today. We will be looking at the current AES Web site which is maintained by the Foreign Trade Division of the Census Bureau.

We will have you work on a typical task that participants of the site often come to the site to do. Your experience is an essential part of our work. We are going to use your comments to give feedback to the developers. Your comments and thoughts will help the developers make changes to improve the site.

I did not create the site, and am really a third party who has come in to assist in evaluating it. So please don't feel like you have to hold back on your thoughts to be polite. Tell us both your positive and negative reactions to the site. And remember, there are no right or wrong answers. We aren't evaluating you but rather we are evaluating how the site works, or doesn't work.

We would like to video tape you during the study. We use it to help analyze the data for this project, mainly because we cannot remember everything. Will this be all right?

### **Give Participant Pre-questionnaire**

#### **Give Participant Consent form**

For the next 60 minutes I'll ask you to work on a task. I'd like you to tell me your impressions and thoughts as you work through the task. We would like you to "think aloud" as you work on the task. This means that as you work on a task, talk to us about what you are doing, what you are going to do, and why. Tell us why you clicked on a link or where you expect the link to take you.

Ask to demo think aloud by looking at the weather website/looking at an information type site you have visited often in the past.

Do you have any questions about the "think aloud" process we ask you to use?

Do you have any other questions now? We'll be able to see and hear you on the television monitor, so if you have any questions during the session please just ask us.

### **Give Participant Task**

#### **When ready to begin first task:**

Begin by reading the task question out loud. As you work remember to please think out loud. If you are quiet I will ask what you are thinking or expecting. I don't mean to interrupt your thought process, rather I just want to remind you to keep talking to me about what you are thinking about as you look and work with the Web site.

**Appendix G – Usability Questionnaire for User Interaction Satisfaction (QUIS)**

*Instructions: For each item, please circle the number that most appropriately reflects your impressions about using this website.*

- |  |                                   |                                    |
|--|-----------------------------------|------------------------------------|
| 1. General reaction to the Web-based questionnaire:                                  | terrible<br>1 2 3 4 5 6 7 8 9     | wonderful<br>not applicable        |
| 2. The task is:  | confusing<br>1 2 3 4 5 6 7 8 9    | straight forward<br>not applicable |
| 3. The characters on the computer screen are   | hard to read<br>1 2 3 4 5 6 7 8 9 | easy to read<br>not applicable     |
| 3. Information displayed on the site:  | organized<br>1 2 3 4 5 6 7 8 9    | disorganized<br>not applicable     |
| 4. Overall experience of entering information:                                       | difficult<br>1 2 3 4 5 6 7 8 9    | easy<br>not applicable             |
| 5. Moving through the questionnaire:   | difficult<br>1 2 3 4 5 6 7 8 9    | easy<br>not applicable             |
| 6. The experienced and inexperienced participant needs are taken into consideration: | disagree<br>1 2 3 4 5 6 7 8 9     | agree<br>not applicable            |
| 7. Making changes to answers:  | difficult<br>1 2 3 4 5 6 7 8 9    | easy<br>not applicable             |
| 8. Use of terminology throughout the site:   | inconsistent<br>1 2 3 4 5 6 7 8 9 | consistent<br>not applicable       |
| 10. Learning to use the site   | difficult<br>1 2 3 4 5 6 7 8 9    | easy<br>not applicable             |
| 11. Overall reactions to the site  | terrible<br>1 2 3 4 5 6 7 8 9     | wonderful<br>not applicable        |
|  | frustrating<br>1 2 3 4 5 6 7 8 9  | satisfying<br>not applicable       |
|  | difficult<br>1 2 3 4 5 6 7 8 9    | easy<br>not applicable             |

**Please add any additional comments:**

## **Appendix H – Usability Debriefing Questions**

### *General*

For several low/high QUIS ratings ask: Can you walk me through your thinking on why you marked (a particular QUIS item) especially low/high?

If you could change one thing with this software what would it be?

### **Novices:**

Comment on whether they would use a paper participant guide/ or whether they would use the online version or neither.

### **Experts:**

Do you ever use the online or paper participant guide?

How did you learn how to use the system?

How many people at your company use the system?

### **Final questions:**

Are there any points you would like to make that have not already been covered?

Do you have comments or suggestions on anything we did not talk about?

**Appendix I – Usability Novice participant task**  
Usability Task—AES*Direct*

Bill Bostic’s CD-ROM Universe in Washington D.C.<sup>10</sup> is selling 18 CD-ROMS to the World Trade Organization in Switzerland.  
<sup>6</sup> Federal Express (FEDEX) is going to pick-up the box on August 4, 2006<sup>7</sup>. space modified

Before FEDEX will accept the package for international shipping you must get a shipper’s export declaration (SED) confirmation number. space modified Getting the SED confirmation number will fulfill the U.S. Government export reporting requirements which you are required to do by law. Use invoice on next page to help you with this task.

To do this you have been told that you need to file a SED online using <http://www.aesdirect.gov>.

The person in the Bill Bostic’s CD-ROM Universe mailroom who usually does this is out this week so you will be filling in. This is your first time using aesdirect.gov so just do as much as you can.

You will need to login to the AES*Direct* website.

Your participantname is: aeslab1

Your password is: boc\*\*1

---

<sup>10</sup> There were five slightly different versions of the Novice Participant Task. The words in blue are those which were added. The main wording change was from the Census Bureau selling CD-ROMs to Bill Bostic’s CD-ROM Universe. This change was made because of participant confusion about it being an internal company vs. an external company.

<sup>6</sup> Some changes related to spacing were done to make reading the task flow better.

<sup>7</sup> This date corresponded to the date of the test.

Invoice for All Novices<sup>8</sup>

INVOICE

<b>TO:</b> Pascal Lamy World Trade Organization Centre, William Rappard, Rue de Lausanne 154 CH-1211 Geneva 21 Geneva, Switzerland		Phone: +41 22 717 71 11 Email: plamy@worldtrade.ch	
<b>FROM:</b> Bill Bostic Bill Bostic's CD-ROM Universe 4700 Silver Hill Road Washington, DC 20036		Phone: (301) 763 4971 Email: bill.bostic@bcu.com	
<b>Quantity</b>	<b>Description of Goods</b>	<b>Net Price</b>	<b>Total Price</b>
3	U.S. Exports of Merchandise on CD-ROM - History 1998-2002	\$150	\$450
3	U.S. Exports of Merchandise on CD-ROM - History 1993-1997	\$150	\$450
3	U.S. Exports of Merchandise on CD-ROM - History 1989-1993	\$150	\$450
3	U.S. Imports of Merchandise on CD-ROM - History 1997-2001	\$150	\$450
3	U.S. Imports of Merchandise on CD-ROM - History 1993-1997	\$150	\$450
3	U.S. Imports of Merchandise on CD-ROM - History 1989-1993	\$150	\$450
18	<b>GRAND TOTAL</b>		\$2,700

<sup>8</sup> The USPPPI address was slightly changed after the fourth participant. Also, phone numbers were added.

## Appendix J – Usability Expert Participant task

### Usability Task—AESDirect Expert

Your company, Wooden Exports (EIN 987456123), has attempted to file an electronic shipper's export declaration (SED) with no luck. Your attempts to file have resulted in a fatal error. Before you export your shipment, you **MUST** obtain an Internal Transaction Number (ITN).

To obtain an ITN, you must:

- Log into AESDirect at <http://www.aesdirect.gov>
- Obtain the error message for your shipment
- Retrieve the shipment, and correct the errors
  - *To correct the errors, please use the Test Invoice provided*

Getting the ITN will fulfill the government export reporting requirements that you are required to do by law.

You will need to login to the AESDirect website.

Your participantname is: aeslab1

Your password is: boc\*\*1

The Shipment Reference Number will be provided to you.

**Invoice for All Experts**

**Wooden Exports**

4700 Silver Hill Rd  
Suitland, MD  
301.555.1212  
Tax ID: 987456123

DATE of Export: 06/23/2006

---

Customer Number	Sales Order	Purchase Order	Contract Number
152	88656	CONTRACT	CONTRACT

---

Ultimate Consignee:  
Company: ABC Company  
Street: 123 Lobos St  
City: Nuevo Laredo  
State: Guerrero  
Country: Mexico

Payment Terms: Net Cash

Incoterms: FOB - P&W Factory

Shipped From: Nogales, AZ  
Shipped Via: Truckers Express, INC

---

Item	Part Number / Part Name	QTY/UOM	Unit Price (in USD)	Value for customs purposes (in USD)
0001	400-B152-656 Ball Point Pens Total Weight: 500 kg Delivery No: 80945864 Transport No: 80945864	1345/GRS		\$5,000.00
0002	400-B152-670 Laser Printers Total Weight: 4322 kg Delivery No: 80945864 Transport No: 80945864	40/NO		\$3,010.00

---

Export Control Data:

Export Lic: NLR

I have certified this information to be true and correct:

\_\_\_\_\_  
Jane Smith Export Manager

## Appendix K – Usability Behavior Codes for Logging

<b>Events</b>	
TA Talk	Test Administrator talks
Participant Talk	Participant talks
Comment	Comment by logger
Confusion	Confusion pointed out by logger
Internal Comment	Internal comment made by logger
Other	Other comment made by logger
<b>Behaviors</b>	
expert a log in	Participant logs in
expert b id	Participant identifies errors
expert c error	Participant fixes errors
expert d itn	Participant submits/ gets ITN
nov task 1a	The time between participants logging in and clicking create new shipment
nov task 1b	The time between participants getting to create new shipment and clicking edit
nov task 1c	The time between participants going from create new shipment to USPPi
nov task 1d	The time between participants going from USPPi and finishing Ultimate Consignee
nov task 1d fr	The time between participants working in Ultimate Consignee and working in (the optional field) Freight Forwarder
nov task 1e	The time between participants getting to add line item and participants adding all items
nov task 1f	The time between participants clicking Send SED and when the TA wraps up the session

Appendix L – Usability Findings: Screen Shots with Comments for AESDirect

The screenshot shows the AESDirect Shipment Viewer interface. The browser address bar displays the URL: https://www.aesdirect.gov/aesdirect/system/e2.cgi?r\_mod=5&p\_action=new. The interface is divided into several sections: 'General Information' (Shipment Information, Commodity Details), 'Shipments' (Main Menu, Create, Reporting, Delete), 'Profiles' (USPPIs, Consignees, Forwarders), 'Templates' (Delete), and 'EDI Upload' (Upload). A 'Submit SED' button is visible at the bottom.

**Annotations and Callouts:**

- Top Left:** A callout box states: "Some users did read the instructions at the top of the screen. The instruction: 'To edit an SED Section, select the section to be edited from scrollbar, and click 'Edit Section'' did not make sense as (1) users didn't think they were editing a section and (2) it was not clear what was meant by 'select' or 'scrollbar.'"
- Top Center:** A callout box explains: "To view an SED Section, click the down arrow next to the section name in the colored boxes above. To edit an SED Section, select the section to be edited from scrollbar, and click 'Edit Section'. To send SED to AESDirect, click 'Submit SED'".
- Top Right:** A callout box notes: "Users tried to click on the blue and red words anticipating that if they clicked on them an input field would open." This points to the 'Foreign Trade Zone' and 'Export Port' labels.
- Bottom Left:** A callout box says: "Users tried to double click on the black words in the white box in the upper left hand corner of the screen, often after being prompted by the test administrator to look at the box." This points to the 'Shipments' menu.
- Bottom Center:** A callout box states: "Once prompted by the Test Administrator to highlight a word, some users commented that they did not realize the buttons 'Submit SED' or 'Edit SED' were related to the words in the white box above." This points to the 'Submit SED' button.
- Bottom Right:** A callout box notes: "Users looked the page over and felt they needed to click on the purple 'Create' link which, once they clicked on it didn't change the page or make any difference that they could see." This points to the 'Create' link.
- Far Right:** A callout box says: "When not sure what to do on the page, users tried clicking into 'reporting' or 'retrieve.'" This points to the 'Reporting' and 'Delete' links.

Figure 36 Usability findings: Large screen shot of AESDirect Shipment Viewer. Participants experienced many problems on this page including the most challenging aspect of how to get into the form.

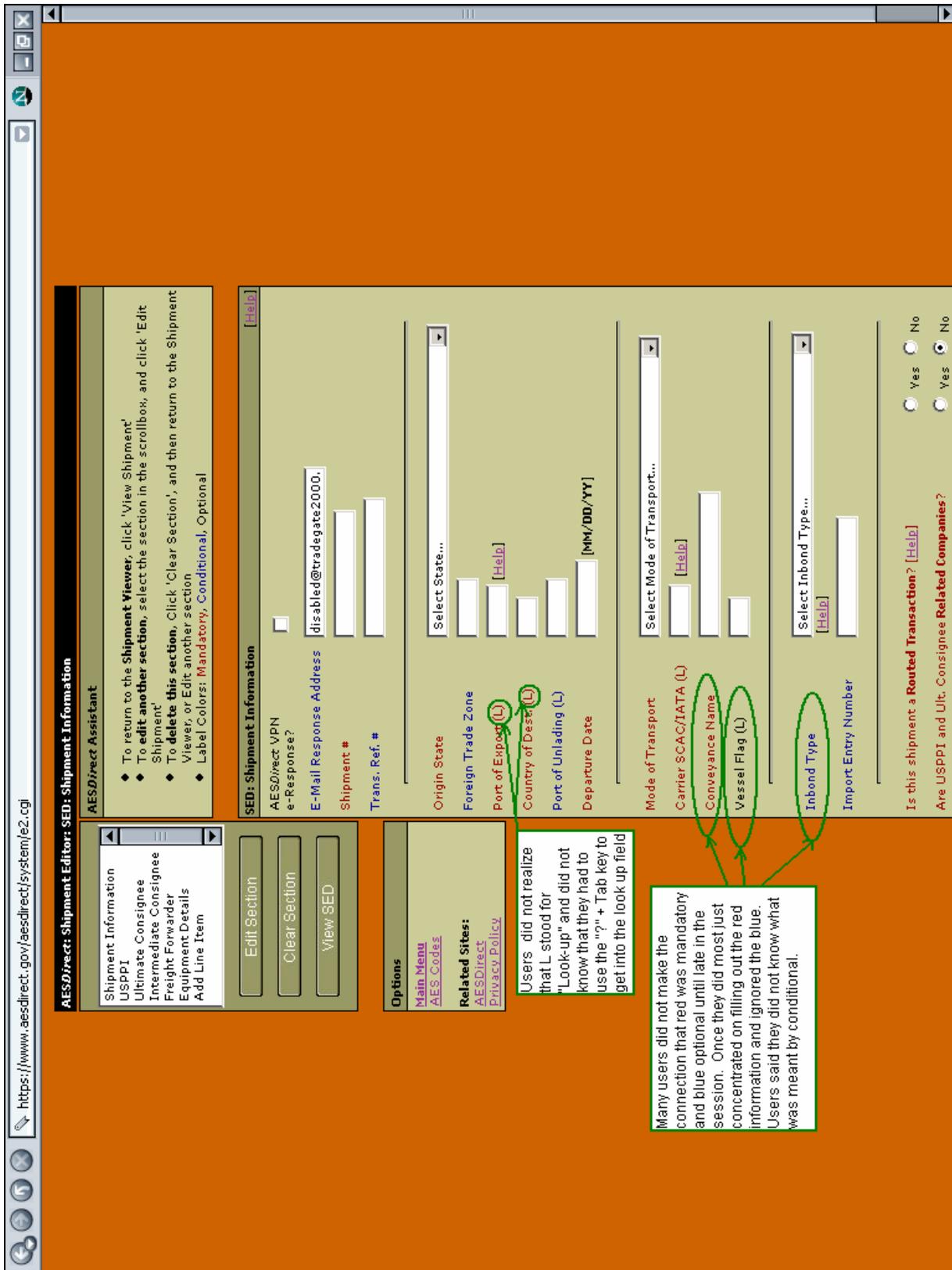


Figure 37. Usability Findings: Large screen shot of AESDirect Shipment Editor with form fields available to fill out; participants had no idea how to enter codes.

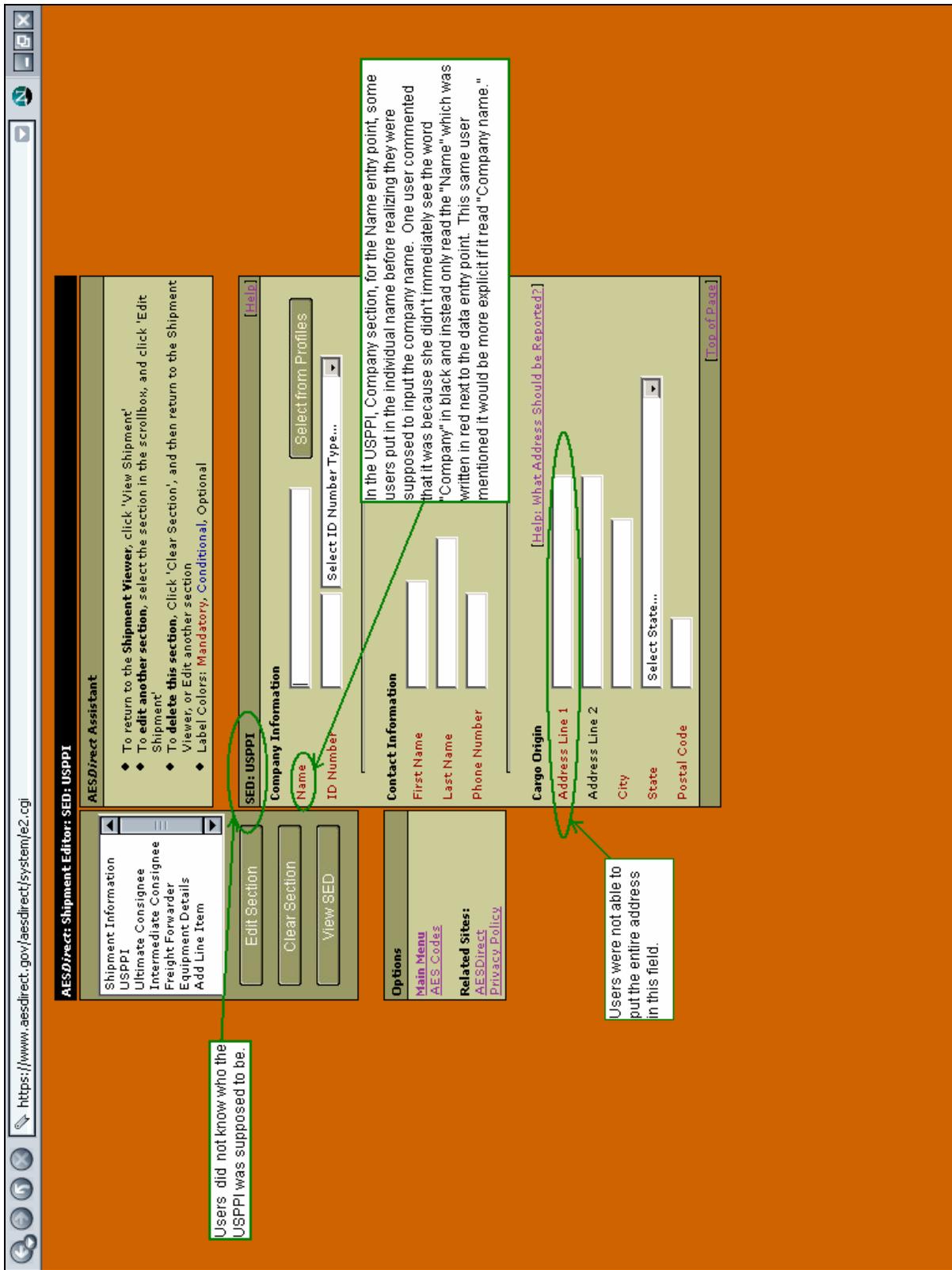
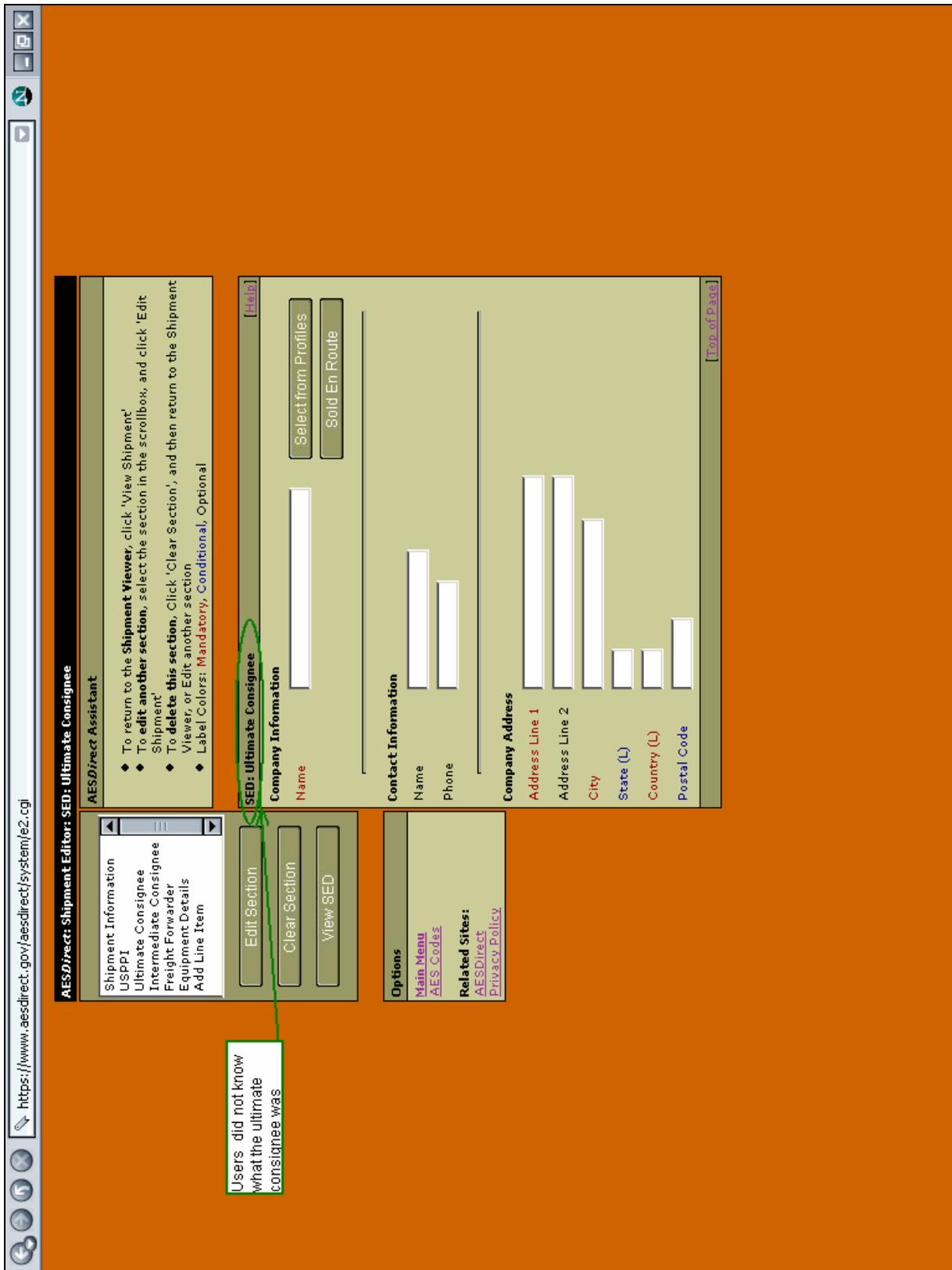


Figure 38. Usability Findings: Large screen shot of AESDirect USPPi form; participants didn't know what or who the UPPI was.



**Figure 39. Usability Findings: Large screen shot of AESDirect Ultimate Consignee form; participants didn't know what or who the Ultimate Consignee was.**